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AUTHOR	Vietze, Peter M.; And Others
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ABSTRACT

This paper reports on a longitudinal study involving 48 mother-infant dyads that attempts to explore the role of the caregiver-infant interactional environment in determining cognitive functioning as related to an understanding of environmental contingencies. The present report includes (1) a progress report to date of the longitudinal data collection of the Origins of Infant Competence; (2) a description of the inter-observer reliabilities from the pilot study and the first phase of the longitudinal study; (3) description of the data-reduction scheme and computer programs devised to organize the observational data; (4) preliminary results of the pilot observational study that examined the (a) effects of infant state, caretaking setting, and maternal proximity on vocal behavior of infants and mothers; (b) patterns of maternal behavior in intervals antecedent and consequent to infant vocalization onsets; and (c) the temporal structure which characterized alternation of vocal activity between infants and mothers; and (5) a description of the sample for the longitudinal study. Appendices contain the observational code used, a computer program written for the data (56 pages), and materials used in contacting parents. (Author/SB)

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TRI-ANNUAL REPORT, INFANT COMPETENCE PROJECT, July 31, 1974

Peter M. Vietze

With the Assistance of: Barbara Strain and Susan Falsey

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Tri-Annual Report, Infant Competence Project, July 31, 1974

Peter M. Vietze

The present report includes 1) a progress report to date of the longitudinal data collection of the Origins of Infant Competence; 2) a description of the inter-observer reliabilities from the pilot study and the first phase of the longitudinal study; 3) description of the data-reduction scheme and computer programs devised to organize the observational data; 4) preliminary results of the pilot observational study; 5) a description of the sample for the longitudinal study; 6) results of the preliminary data analyses obtained from the experimental procedures to assess learning and visual habituation.

I. Progress Report of the Longitudinal Study

Recruitment of the sample: In order to guarantee that data on 48 infants would be available by the end of the study, 54 families were successfully recruited to participate in the study by the beginning of June 1974. By the last week in June, data collection was complete for all 54 infants and mothers for the first phase of the study. However, since completion of this phase, two families, one with a male infant and one with a female infant, have dropped out of the study as a result of their moving out of the area unexpectedly. Thus the sample remains at 52 with 27 females and 25 males.

Phase I

A. Experimental Tasks By the middle of July all the experimental data had been collected, scored and punched on data cards. This was a little bit behind schedule partly as a result of the loss of one of the research assistants in the beginning of June. This data has been subjected to data analyses

to evaluate the performance of the sample as a whole on each of the experimental tasks. The results of these analyses will be presented elsewhere in this report. In addition, data reduction schemes are being explored to summarize this experimental data for later inclusion in multi-variate data analyses. Some of the preliminary summary scores have been included in a correlation matrix to explore the relationships between some of these measures and the Bayley Scales variables. Although extreme efforts were made to obtain complete data from all infants in the experimental procedures, approximately 15% of the infants did not complete the laboratory tasks due to fussiness. In every case, several attempts were made to obtain the data by rescheduling laboratory visits up to three times. Attempts to establish some systematic explanation for this subject attrition have not met with any success--ie. no factor which is obvious seems to account for some subjects "refusal to cooperate". It should be mentioned, however, that 15% attrition is extremely low for infants under 9 months--many experimental studies report rates as high as 50% and so we are not too displeased with this rate of missing data.

B. Bayley Testing As anticipated, there are no particular problems which we have encountered in administering the Bayley Scales. Mean D.Q. for the Mental Scale is 110.0 while that for the Motor Scale is 121.47. In addition to the overall scale scores, the items have been clustered by what they are measuring into a social scale, auditory scale and a visual scale. Also, 5 scales used by Yarrow, Rubinstein, Pedersen, and Jankowski (1973) have been used to extract additional clusters: visual attention, visual reaching, gross motor, fine motor, and social. These will be used to establish some construct validity with previous work by Yarrow et. al. When responsiveness

measures are available from the observational data, these subscales will be correlated with the measures of maternal responsiveness to evaluate the relationship between maternal style variables and infant performance measures.

C. Maternal Attitude Scale This self-report measure developed by Cohler (Cohler, Weiss & Grunebaum, 1970) was administered to all the mothers during one of their visits to the Infant Laboratory. The 233 items have been transferred to data cards and computer scored by Cohler at the University of Chicago. There are 37 variables derived from this instrument including empirical, theoretical and factor based scores. Thus far, only the five factor based scores have been analyzed with the other data. A preliminary correlation matrix was computed which showed no significant correlations between MAS factor scores and the infant performance measures. This instrument will be administered again when the infant is a year old.

D. Observational Data As mentioned above, all the first phase data has been collected including the observational data. Prior to completion of the Phase I data collection, procedures to transfer the observation interaction data to the computer were initiated. The steps include: 1) decoding the audio tape on which the data is recorded using the Datamyte; 2) correcting machine and observer errors (as these can be detected) on a print-out from the computer terminal; 3) loading the data from paper-punch tape (produced when the audio tape is decoded) to the disk and magnetic tape storage systems of our PDP 11/40 computer; 4) correcting all discernible errors on the disk version of the data; 5) transferring the corrected data to magnetic tape. By the end of July these steps had been completed for all 54 records collected between March and June. During this time, the computer programs which have been written to reduce and analyze the observational data were being revised.

To date these revisions are incomplete. The revisions came about as a result of our experience with the pilot study now completed. Since it was impossible to know exactly what variables might be useful, several extra data reduction steps were included in the programs. These are being deleted and the program made more efficient. It is exptected that the revisions will be finished by the beginning of October and that the observational data will be ready to be run off then. Following this step, dependent variables derived from the initial analysis will be transferred to data cards and incorporated in the multi-variate analyses for the first phase.

Phase II Preparations

A. Experimental Tasks Beginning in May, the experimental procedures for Phase II were finalized. Pilot subjects tested using the previously used "string pulling" response were tested. However, due to unexplainable difficulties, a large number of pilot subjects tested did not complete the sessions due to fussiness. It was decided that a new apparatus and procedure would have to be developed. In consultation with Mr. Harold Stone, the Kennedy Center Apparatus technician, a response system was built in which the infant was able to push either of two levers in order to gain access to either a visual stimulus or an auditory stimulus. This apparatus was tested and proved to be an admirable improvement of the previous "string-pulling" apparatus. The levers are situated below a rear-projection display screen and fastened to an infant feeding table. The infant can operate either lever with a minimum of effort to provide contingent feedback. A picture of a 2 year old child which remains on the screen for 3.5 seconds and a 3.5 second segment of a bluegrass banjo music tape serve as the visual and auditory reinforcers respectively. The experimental design is similar to that used in Phase I.

After the subject is made comfortable in the feeding table, a one minute baseline period followed by 4 minute contingency, 2 minute baseline and another 4 minute contingency period ensue. Observers monitor visual attention, non-distress and distress vocalizations and smiles. If the infant becomes fussy, the session is terminated and another attempt is made after the infant regains its composure. If necessary, the infant is scheduled for another lab session and another attempt is made. In all, three attempts are made to test the infant.

B. Habituation Pilot infants tested in June did not maintain sufficient attention to the checkerboard stimuli used during Phase I and so it was decided that facial stimuli would be utilized in Phase II. Color photographs of a girl smiling and frowning were tested and proved to be attractive enough to infants to warrant their maintaining attention for up to 30 seconds initially. Pilot testing also indicated that some infants looked for less than 10 seconds and so the initial looking criterion was lowered to mean looking time of 8 seconds taken on two consecutive presentations. The same decrement criterion of a 50% reduction in looking time used in Phase I was selected in order to maintain some continuity with the earlier assessment. Again, infants were held by their mothers during the habituation procedure in order to minimize fussing. A similar design was used in order to provide controls for fatigue. Thus, half the infants are being tested with the smiling face and half are being tested with the frowning face with the other stimulus used to test for recovery of attention. In addition, to insure that failure of recovery is not due to the similarity of the stimuli, an upside-down monochrome face is presented at the end of the series for two presentations. In order to provide positive evidence of true habituation, half of the subjects are shown the

initial stimulus for two extra trials following their reaching decrement criterion before being presented the second stimulus.

C. Observation of Interaction Prior to the beginning of Phase II, video tapes of 6½ month old infants being fed and entertained by their mothers were made in order to revise the observational code. Initially, the observers attempted to code these tapes using the observational code as it was being used for Phase I. It became evident that two significant changes had taken place in the infant-mother interactions. First, many of the infants were, as expected, becoming mobile. Some crawled, some scooted, some dragged themselves around the room. Secondly, they seemed to be much more adept at handling objects in their immediate environs. They reached, grasped, threw, dropped, mouthed, and otherwise explored and played with objects and toys. In addition, their mothers, having observed this change, encouraged such interactions in various ways. In order to incorporate what we considered to be important changes in behavior, we modified the proximity code so that it was now possible for the infant to initiate proximity changes between itself and the mother. We also elaborated the codes dealing with interaction with objects by expanding the number of third digit codes to indicate the varieties of infant-mother-object transactions. These are presented in Appendix A and can be inserted in the observational manual according to the page numbers. After agreeing on the changes, the observers spent several weeks between the end of Phase I and the beginning of Phase II practicing with several pilot subjects. Once more, high reliability was established for both frequency and duration measures as both levels of these are utilized in data analysis.

D. Carey Scale of Infant Temperament In order to provide a maternal report measure of how the infant deals with every-day occurrences and events, a questionnaire devised by a pediatrician, William Carey (1970) was incorporated

into the study. This questionnaire is based on an extensive interview used in the New York Longitudinal Study of the last decades (Thomas, Chess, Birch, Korn, & Hertzig, 1963) and gives some indication of how the mother perceives her infant along several dimensions. The goal is to be able to classify the infants according to activity into "easy", "medium", or "difficult" infants. It is expected that this will give an indication of the match between infant temperament and maternal style. The questionnaire can be self administered and so we are asking the mothers to fill them out and return them by mail. By the end of July, only 4 infants had been completed on Phase II data collection. It is expected that Phase II data collection will be completed by the end of October.

II. Inter-observer Agreement

Three criteria were selected for establishing inter-observer reliability of the observational data: 1) that adequate inter-observer agreement exist on each category in the observation system before data collection begins (Weick, 1968), with a minimum level of agreement set at 85 percent as suggested by Gellert (1955); 2) that checks be made on the maintenance of initial inter-observer agreement during data collection (Gewirtz & Gewirtz, 1969; Patterson and Cobb, 1971; Reid, 1970); and 3) that reliability indices be established on scores which correspond to each form of the dependent variable (e.g. frequency of occurrence, duration, etc.) planned for use in the final data analyses (Frick and Semmel, 1974).

Initial data collection for reliability purposes was planned to continue until acceptable levels of agreement for each behavioral category on six dyads, three with male infants and three with female infants, were reached. Inter-observer agreement checks were made again at the mid-point and near the

end of data collection on the 24 dyads in the pilot study and throughout the data collection in Phase I. For the in-process observation visits, both observers collected data on the entire session for reliability purposes but only one observer's data for each visit contributed to the final analyses.

From each of the pairs of observation records done to check reliability, five to fifteen minutes of continuous interaction from the initial, middle and final portions of each approximately 90 minute session. The segments were selected to sample different caretaking settings. A total of 20-30 minutes from each observer's record contributed to the reliability check for each observation session.

Since dependent variables in the form of overall duration of behaviors and antecedent-consequent relationships within 10-second intervals were to be used in data analyses, inter-observer agreement was established on the reliability data for both types of scores. First, to assess the reliability on duration of behavior categories, the records were divided into consecutive 1-minute segments. The duration of each category of maternal and infant behavior was summed per minute. This process was carried out on each observer's record. Pearson product-moment correlation coefficients were calculated between the two observers for each category, using the duration of the category, in seconds, for each 1-minute interval.

Secondly, a standard percentage agreement index to assess agreement between observers in coding the presence or absence of behavioral categories in short consecutive time intervals was applied to the same portions of the reliability records described above. For this purpose, the records were divided into 10-second intervals. A 10-second interval unit was selected to correspond with the time period used to define antecedent and consequent behavioral events in data reduction and analyses (Level II) described in the

next section of this report. Each 10-second unit was scored in terms of whether the two observers agreed or disagreed on the common occurrence of each maternal and infant behavior category. The number of agreements was totaled and divided by the sum of the number of agreements and the number of disagreements. Intervals in which the observers agreed that no instance of a category occurred did not contribute to the total number of agreements since this gives deceptively high agreement scores by inflating the actual frequency of occurrence of the event (Bijou, Peterson, Harris, Allen, & Johnston, 1969).

Results of the initial and in-process reliability checks are summarized in Table 1 for the pilot study and the Phase I observations. The correlational index resulting in generally higher levels of agreement. Lowest levels of inter-observer agreement were recorded consistently for maternal and infant smile. Smile was a behavior with relatively low frequency of occurrence, which fact tends to reduce the percentage agreement index level (Frick and Semmel, 1974). Also the occurence of a smile is a more subtle behavior to detect than the onset of auditory or tactile stimulation. Visual attention indices which represent attention of one member of the dyad to any part of the body of the other member, rather than eye-to-eye contact, were consistently high. In general, inter-observer agreement in natural settings seems to be more difficult to establish than in laboratory settings. Often, the recording of a particular maternal or infant behavior is largely dependent on the position of the observer relative to the subjects. It is impossible for two observers to have the same position and so the high reliabilities which are presented here are probably affected by the particular homes in which the checks were done. Often furniture arrangement and space in the setting made it difficult for the observers to find locations which gave equally clear unobstructed

Inter-Observer Reliabilities on Home Observations for Mothers and Infants

	Pre-Pilot		Pilot		Pre 2 1/2 Month		2 1/2 Month	
	Frequency	Duration	Frequency	Duration	Frequency	Duration	Frequency	Duration
MOTHER CATEGORIES								
Looks at infant								
n	6	6	2	2	5	5	6	6
X	99.8	.995	98.7	.994	98.8	.997	96.5	.870
Vocs. to infant								
n	6	6	2	2	6	5	6	6
X	97.4	.925	94.9	.980	98.3	.942	90.8	.820
Smiles at infant								
n	6	6	2	2	6	5	6	6
X	84.4	.936	87.5	.941	88.8	.874	82.7	.813
Touch-Play								
n	6	6	2	2	3	3	3	2
X	91.5	.992	100	.989	73.0	.840	66.0	.745
INFANT CATEGORIES								
Looks at mother								
n	6	6	2	2	6	5	6	6
X	99.0	.983	94.4	.924	91.7	.954	90.8	.937
Nondistress vocal								
n	6	6	2	2	6	5	5	5
X	89.2	.935	88.8	.940	83.5	.852	67.6	.716
Smiles								
n	6	6	1	1	3	3	5	3
X	77.2	.909	79.2	.822	76.3	.953	75.6	.650
Distress vocal								
n	6	6	2	2	3	1	5	5
X	97.5	.992	96.2	.987	97.0	.990	82.4	.956

views of the faces of the infant and mother.

III. Data Reduction Scheme for Observational Data

Following editing of the observational records as described above (in Section 1), the corrected records are transferred to disk for processing. The following will present the scheme used for processing the observational data collected in the pilot study. Revisions of the computer program designed for this purpose, DYAD, will be presented in the next report as DYAD 1.

All data reduction operations were carried out for the unit behavior pattern, a configuration of simultaneously occurring behavior categories, as well as for the more molar unit of behavior category, a single behavior modality (vocalization, visual attention, smile, etc.) summed across all patterns which included the particular behavior modality. Corresponding to the three levels of data analysis, 1) effects of infant state and maternal proximity on infant-mother transactions, 2) antecedent and consequent behavior patterns to vocal behaviors between mother and infant, 3) temporal structure which characterizes the vocal transactions between mother and infant, three general strategies for reducing the continuously coded behavioral data are being carried out for each of the 52 records.

A. Level I Non-interactive Analyses For each maternal behavior pattern and each infant behavior pattern, the absolute frequency of occurrence, total duration, and average duration per occurrence is calculated. As each dyad's observation session varies in length, proportion scores are required for between dyad comparisons. Frequencies, durations, and proportions are reduced according to the caretaking setting, infant arousal state, and maternal proximity context conditions under which they occurred. As the naturally-occuring amount of time spent in each context condition varies for each dyad, dependent

variables in Level I are proportion scores representing the duration of the behavior in a particular context relative to the total amount of session time spent in that context. Based on the matrices produced by this level of analysis, particular dependent variables are extracted and entered in analyses of variance in order to determine the effects of proximity, state, sex, or some other variable utilized as an independent variable on the behavior pattern of infant or mother.

B. Level II-Antecedent Consequent Analyses For each onset of an infant vocalization which occurred when the mother was in the same room with the infant, antecedent and consequent maternal behavior patterns are identified. An antecedent maternal pattern is identified as the first maternal behavior pattern which preceded the onset of the infant vocalization in the prior 10-second interval. A consequent maternal behavior pattern is identified as the first maternal pattern which followed each onset of an infant vocalization in the subsequent 10-second interval. A subset of antecedent maternal patterns is identified as continuing behavior, in that the maternal antecedent pattern continued into the 10-second interval following the infant vocalization with no other maternal behavior initiated in the 10-second consequent interval. For Level II analyses the dependent variable for antecedent maternal patterns (or consequent maternal patterns) was a proportion represented by the frequency with which each of the 10 mutually exclusive and exhaustive maternal behavior patterns occurred as an antecedent or consequent pattern relative to the total frequency of infant vocal states. In the same way, the infant's antecedent and consequent behavior patterns can be obtained given a particular maternal behavior or behavior pattern. Since the actual latency between either maternal antecedent to infant response or maternal

response to infant consequent behaviors are also obtained, an analyses of the learning potential in the naturalistic setting is possible by analyzing these latency scores. In addition, other infant and maternal responses can be chosen as the focal behavior pattern in order to determine the antecedent and consequent behaviors of the partner in eliciting and consequating particular responses.

C. Level III-Temporal Structure of Infant-Mother Dialogues Level III data reduction is being carried out to allow a conditional probability analysis of the second-by-second alternation of activity between infants and mothers. This level of analysis can be focused on several behavior patterns but will initially be carried out on vocal behaviors as these probably have the greatest significance for later development. Later, similar analyses will be conducted for visual regard of each other.

The inadequacies of a time independent analysis when applied to questions of complex interactive behavior (Collet and Semmel, 1973; Raush, 1965), especially dyadic vocal interactions (Jaffe and Feldstein, 1970), have been pointed out. Yet although continuously recorded and timed behavioral data can be unitized into consecutive fixed-time intervals of any length, there has been no consensus among investigators as to guidelines for selecting the most appropriate fixed-interval length. Collet and Semmel (1973) have suggested selection of a time interval such that "...the coded behavior applies to the entire interval (p. 6)." The internal digital clock on the Datamyte recorded times behavior changes and durations in units of 1-second. A 1-second unit, therefore was the fixed-time interval for which a distinct code could cover the 'entire interval'. To sample the interaction data using a fixed time interval greater than 1-second would require making arbitrary decisions concerning the proportion of an interval which would have

to be filled by a certain behavior for that entire interval to be designated as containing that behavior.

Thus, each observational record is divided into consecutive fixed-time intervals of 1-second. Portions of each observational record in which maternal proximity is coded as Out of Room are not included in this reduction. For the remaining portions of the record, one of the following four mutually exclusive dyadic vocal states (for the infant, only non-distress vocalizations qualified) is assigned to each 1-second unit: Simultaneous vocalization, Mother only vocalizing, Infant only focalizing, and Mutual silence. The sequence of states formed from this reduction fits the assumptions of a finite Markov process: (1) the number of steps in the sequence is finite, (2) the sequential transitions are discrete, and (3) the probability of a given event depends only on the last preceding event (Raush, 1973). The Markov process describes "...a certain type of process that moves in a sequence of steps through a set of states...When the process is in state s_i there is probability p_{ij} that the next position will be state s_j. The matrix $P=(p_{ij})$ is called the transition matrix. Its entries are non-negative and its rows have sum 1 (Kemeny and Snell, 1963, p. 128)." This transition matrix is a complete description of a first-order Markov process (Hertel, 1972).

A first order transition matrix is constructed for each dyad giving the frequency with which a vocal state at time "t" moved in the next 1-second interval (time "t+1") to any vocal state, including itself. From this matrix of transition frequencies, transition probabilities for each cell are derived by dividing the cell frequency by its corresponding row total. The dependent variables formed from Level III reduction, therefore are the conditional or transition probabilities represented in the cells of the matrix constructed for each infant-mother dyad.

Following is a list of the 16 subroutines that make up the program DYAD and a brief description of what each does. The complete program may be found in Appendix B.

DYAD

Preliminary Subroutines

1. ZERSET - Zeros out arrays and matrices used for each subject.

2. SEP - separates the 2 or 3 digit code into 3 separate numbers. If it was a 2 digit code the 3rd number is a 1.

3. ITOJ - takes a behavior pattern and returns a string that contains the categories present in the pattern

Level I

4-5. MATP, MATC - fills in matrices for frequency onsets and durations.

6. STATE - fills in matrices of state by proximity by behavior.

7. WR1 - prints matrices from MATP and MATC, calculates proportions and summaries.

8. WRA - prints matrices from STATE, calculates proportions and summaries.

Levels II and III

9. FILL - creates the matrix that holds 500 seconds of behaviors for mother and infant. (When FILL reaches 500 the following three subroutines operate).

10. IAC - creates antecedent-consequent matrices.

11. MAT - creates transition matrices.

12. REFILL - Zeros out 500 second matrix and resets initial values so next 500 seconds can be collected.

13. WR2 - prints antecedent-consequent matrices, calculates proportions.

14. WR3 - prints distributions of consequent latencies.

15-16. WR4, WR5 - prints transition matrices.

IV. Preliminary Results of the Pilot Observational Study: Early Diaglogues

Much has been written in support of the notion that the early mother-infant interactional environment is the arena in which the infant learns (Lewis & Goldberg, 1969; Gewirtz & Gewirtz, 1969; Yarrow, 1963). The learning which apparently takes place as a result of the infant's experience with the primary caregiver (usually the mother) includes learning to control environmental events, learning self-other differentiation, learning to talk, learning to walk, learning about objects presented by the caregiver, etc. The present study is an initial attempt to study the patterns of infant-mother interaction in order to understand the dimensions which might lead to a learning analysis of infant-mother interaction. The broader issue in which this research is embedded is whether the caregiver-infant interactional environment is an important determinant of cognitive functioning as this depends on the understanding of environmental contingencies. That is, does the infant learn which aspects of its environment it can come to control and does this learning relate to the way in which the infant subsequently negotiates its way in its one year old environment. The present study addressed itself to some of the variables which might affect the interactional behavior of 14-week-old infants and their mothers: infant state, maternal proximity, and caretaking setting. In addition, the study was an attempt to develop some data analytic techniques to analyze interactional variables from a learning viewpoint. The study was focused on the vocal interactions of the infants and mothers as they occurred in the context of other behaviors.

A system for continuous, in-home observation of vocal communication patterns embedded in the social interactions was developed and utilized. This procedure was created to be methodologically consistent with a theoretical

model of the reciprocal, bidirectional nature of the infant-mother relationship. The purpose of the study was to examine the 1) effects of infant state, caretaking setting, and maternal proximity on vocal behavior of infants and mothers; 2) patterns of maternal behavior in intervals antecedent and consequent to infant vocalization onsets; and 3) the temporal structure which characterized alternation of vocal activity between infants and mothers.

Twenty-four dyads, each composed of a 14 week old infant (12 males and 12 females) and its mother were observed for approximately 90 minutes during 1 waking period including dyadic and solitary play and several caretaking routines. Maternal and infant social behavior recorded as sequences of mutally-exclusive behavior patterns as well as changes in setting, maternal proximity, and infant state were continuously recorded and timed by 1 observer using a portable electro-mechanical keyboard recorder unit (Datamyte, Electro/General). Visits were divided between 2 observers on whom high inter-observer reliabilities were established initially and during the data collection.

No overall sex of infant difference for frequency or duration of vocal behavior was found for infants or mothers. Vocal behavior of infants and mothers occurred most often when the infant was in an active state. Infants vocalized significantly less when being held than when mother was within arms' reach; amount of maternal vocalization did not differ between these two proximities. Infants also vocalized significantly more often when mother was absent than when being held, with females' solitary vocalizations co-occurring with contact with an object significantly more often than for males. No overall sex of infant differences were found for any infant or maternal non-vocal category.

For all dyads, maternal vocal and visual behavior was the most frequent

behavioral pattern antecedent to the onset of infant vocalization, with maternal vocal and visual attention also the most frequent response to infant vocalizations. Males vocalized selectively in response to maternal vocal-visual-smile patterns. Moreover, mothers of males responded differentially to infant vocalization with physical play stimulation.

In order to understand the interactional nature of the vocal activity of the dyads, each observational record (when mother was in the room) was divided into consecutive 1 second intervals which were assigned to 1 of 4 dyadic vocal states. These included simultaneous vocalization, solitary mother vocalization, solitary infant vocalization, and mutual silence. This sequence of vocal states fits a finite, Markov process model and could be represented by a first-order transition probability matrix, or state transition diagram as suggested by Stern (1974). As illustrated in Figure 1, transition probability values were quite similar for males and females, and, in fact, the values were strikingly similar for all 24 dyads suggesting a basic temporal rhythm which characterized alternation between vocal states.

Solitary maternal vocalizations dominated solitary infant vocalization by a ratio of 10 to 1 (46.8% to 4.1%), with mutal silence and simultaneous vocalization occurring 39% and 9.6% of the time respectively. Twice as much infant vocalization occurred in simultaneous as in solitary vocal activity. Analyses of transition probability scores indicated mothers were significantly more likely to "break" mutual silences. In contrast to Lewis' (1972) findings, however, vocal initiations by infants as well as mothers were significantly more probable given the occurrence of the partner's vocalization in the preceding interval than if the partner was silent. Mothers were more likely to move from silence to simultaneous vocalization with their infants than were infants

to "join in" with their mothers. Furthermore, simultaneous episodes moved more often into solitary mother vocalization than into solitary infant vocalization ($F = 37.04$; $df = 21,22$; $p < .001$).

These patterns are quite different from the standard temporal parameters for dialogues among older individuals (Jaffe & Feldstein, 1970). Maternal "joining in" and prolonging simultaneous vocal episodes may have reflected efforts to stimulate prelinguistic sounds or to regulate vocally the degree of dyadic social contact as Stern (1974) suggests. Moreover, further analysis of the observational records indicated significantly more infant vocalization occurred when mother was out of the room than when she was holding the infant. This suggests that perhaps infant vocalization has an important function in addition to social participation. While laboratory investigations have found that maternal vocalization during infant vocalization has the effect of terminating the infant vocalization, a "suppression" of infant focalization effect, (Kagan & Lewis, 1965; Webster, 1969) the present results did not support this notion.

The analyses of the data from the pilot study are not complete but they do indicate that the observational instrument and data reduction and analysis scheme is a productive one for explicating the fine-grain interactional behavior of mothers and infants. The pilot study suggests a unique and complex structure for early vocal exchanges and the usefulness of an observational methodology consistent with a bidirectional model of early social interaction. Data now being analyzed from the first phase of the longitudinal study will allow for interesting cross sectional comparison between 10 and 14 week old infants and their mothers when taken together with the pilot study briefly reported here. These comparisons probably will be possible by the first report of the second contract year.

V. Description of the Sample for the Longitudinal Study

In order to maximize the changes for obtaining complete data on the desired sample size, N = 48, a predominantly middle-class group was selected to participate in the study. Names of all families to be contacted were selected initially from birth records at the Tennessee State Department of Public Health according to the following criteria: all infants were first-born, full-term singletons with birth weights between 5.5 and 9.5 pounds and were free of significant health complications as indicated on the birth record; parents of these infants were married, with each parent over 20 years of age and at least a high school graduate. All of the information contributing to these criteria is given on each birth record in Tennessee. As part of this research was to be conducted in the home, and additional selection factor involved geographic location. Families living at a distance greater than 20 miles from that part of central Nashville, Tennessee were excluded. In addition, as the initial contact with all parents was by telephone, families who met all other criteria but were without telephone service or who had unlisted phone numbers were not accessible for recruitment.

Parents of infants who met the above criteria were contacted in random order by telephone and the purposes and requirements of the study were introduced by a female research assistant. The standard initial telephone contact procedure is included in Appendix C. Before further information was given, it was determined that the mother was the primary week-day caretaker and that the family would be in the city for the next year. For parents who were interested in possible participation, a letter explaining the details of the study (see Appendix C) and what was required for participation was sent with the understanding that a second phone call a week later would be made to see

TABLE 2

Potential Sample of Families Meeting Selection Criteria

From Birth Records 12/24/73 - 4/18/74

	Total Frequency	%	High Ed.* Frequency	%	Low Ed. Frequency	%
Potential N	213		148		65	
No phone	44	21	27	18	17	26
Never contacted	22	10	19	13	3	5
Contacted by phone	147	69	102	69	45	69
Refused initial contact	44	21	20	14	24	37
Letter sent	103	48	82	55	21	32
Refused after letter	49	23	37	25	12	18
Included in study	54	25	45	30	9	14

* Both parents education $\geq$ 14 years

if the family was still interested. At the time of the second phone call, if the family was interested in participating in the study, an initial appointment to conduct the observational session was made. Table 2 describes the number of potentially qualifying families selected and those which were located by telephone listing, contacted, sent the letter, and agreed or refused to participate. Since the data had to be collected as the infants were born, it was not possible to randomly select the sample from the population as a whole. However, as much as possible, the families who were included were randomly selected from the ones who were sent letters. The birth rate did not allow completely random selection at any one time. Families were contacted initially when the infant was 8 weeks old in order to allow ample time to recruit the sample for any one week and still see the mother and infant when the infant was 10-11 weeks of age. Table 3 includes the characteristics of participating infants and parents, for infant's age at Phase I, birth weight of infant, weight at time of Phase I, mother's age and education and father's age and education. As can be seen from the data, there are no apparent differences between males and females in the study, with the exception that the boys weighed significantly more than the girls at the beginning of the study ($t = 3.06$; $df = 52$; $p < .01$).

TABLE 3 - Characteristics of Sample

	Males			Females		
	X	Range	S.D.	X	Range	S.D.
Infant Age in days	75.78	69-84	4.22	75.33	69-84	4.03
Birth Weight	121.6	101-142	11.1	119	95-155	13.23
Current Weight	209.6	130-256	25.6	188.7	126-224	23.68
Mother's Age (years)	26.26	24-32	2.44	25.59	21-31	2.78
Mother's Education	15.41	12-18	1.74	15.19	12-18	1.78
Father's Age (years)	28.44	24-42	4.41	27.81	24-34	3.00
Father's Education	16.26	12-19	1.63	16.11	12-18	1.45

VI. This section is found under seperate cover.

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APPENDIX A

6 1/2 Month Old Revisions of Interactional Code

SETTING (6 month olds)

The Setting code is entered initially and whenever a change occurs in the type of caretaking activity.

NO CARETAKING

Definition: This category indicates any type of interaction between mother and infant which does not involve any of the caretaking routines listed below or not interaction occurring between infant and caretaker. I feeding himself, non-mother initiated = coded no caretaking, not feeding

FEEDING

Definition: Mother initiates feeding of the infant with breast, bottle, cup, spoon, or manually. Feeding begins with first mouthful infant eats and continues through any temporary breaks (getting more food, rearranging baby, etc.) and includes burping routines during or following feeding.

ALL OTHER CARETAKING/PHYSICAL HEALTH NEEDS

Definition: Mother is (1) bathing infant in tub, sink, or sponging infant's entire body, (2) changing infant's diaper, or (3) undressing or redressing infant, (4) grooming infant (cutting fingernails, combing hair), or (5) binding up of wounds (cleaning cuts, bandaging scrapes). Bathing begins with undressing and includes cleaning ears and nose, drying and redressing infant.

PUTTING TO SLEEP

Definition: Mother is preparing infant for sleep: rocking, arranging crib covers, etc. This setting is defined by mother's behavior, not by cues of infant state. Infant may not necessarily go to sleep, but mother is attempting to put infant to sleep.

INFANT RESPONSES DIRECTED TO OBJECTS

Infant is interacting with object if he is looking at the object, reaching for, mouthing, waving, banging or manipulating it alone or with mother. When infant is observed to be interacting with an object, one of 4 possible codes (0-3) is used as a third digit to modify any one of the ten 2-digit infant behavior patterns which might accompany this interaction with object.

Coded as Objects (Examples)	Not coded as Objects (Examples)
Infant's or Mother's clothing, jewelry	Undefined spaces, directions
Pets	Walls
Mirror (images in mirror)	Ceilings
T.V.	Infant's or mother's body part (hand, foot)
Toys	Food (during feeding setting)
Household items	
Feeding utensils	
Food (in other than feeding setting)	

A. Social Play

Definition: Infant is "playing socially with an object" if he is engaged in initiating or continuing a reciprocal activity with his mother which involves an object, i.e., handing object to mother (regardless of mother's reaction) reaching for object held by mother, rolling a ball back and forth to mother, mother and infant holding an object together. (Infant does not have to be aware of mother's also interacting with object and him/her.) The 3rd digit coded for this behavior is a "0" which is used to modify any of the 2-digit patterns which might accompany this social play.

For example:

a. 6-4-0 Infant looks at Mother, vocalizes, and plays socially with an object.

b. 6-8-0 Infant smiles and plays socially with an object.

c. 6-9-0 Infant utters a distress vocalization and plays socially with an object.

Social play may be followed very quickly by solitary manipulation.

B. Manipulation

Definition: Infant is "manipulating an object" if he is touching, holding, mouthing, banging, or waving object. (using hands, feet, or any body part) The 3rd digit code for this benavior is a 1.

For example:

a. 6-1-1 Infant vocalizes and manipulates an object.

b. 6-3-1 Infant looks at mother, smiles, and manipulates an object.

c. 6-5-1 Infant looks at mother, vocalizes, smiles, and manipulates an object.

C. Reach/Approach

Definition: Infant is "reaching for or approaching an object" if he attempts to get an object that is beyond arm's reach. This may include stretching to reach an object, scooting

toward an object, crawling to an object, etc. The 3rd digit code for this behavior is a 2. Most likely accompanied by visual attention to object.

For example:

a. 6-2-2 Infant looks at mother and reaches for or approaches an object.

b. 6-6-2 Infant reaches for or approaches an object.

c. 6-7-2 Infant vocalizes, smiles, and reaches for or approaches an object.

D. Looking Only

Definition: Infant is "looking only" if he looks at an object and does not interact with it in any of the above ways, i.e., looking at a mobile without reaching for it. The 3rd digit code for this behavior is a 3.

For example:

a. 6-1-3 Infant vocalizes and only looks at an object.

b. 6-6-3 Infant only looks at an object.

c. 6-8-3 Infant smiles and only looks at an object.

Rules for Object Codes

1. The inanimate object must have definable bounds. Looking at surfaces, walls, ceilings, etc. is not coded.
2. Notice the distinction in coding between examples (a) and (b) below:

(a) If observer cannot judge whether an object held by mother or

mother herself is the focus of the infant's visual attention, code 6-2, infant looks at M rather than 6-6-0, infant looks at object.

(b) If infant is looking at both mother and object, i.e. peek-a-boo with a cloth, code a 6-2-3.

(c) If infant is manipulating an object, is looking at mother, and is not engaged in social play, code 6-2-1.

3. The infant may interact in different ways with 2 objects at the same time, i.e., reaching for one object while manipulating another. A hierarchy has been established to cover these situations. If an infant is engaged in social play code a 0 even if infant is stimultaneously manipulating, reaching for, or looking at another object, i.e., a 0 code takes precedence over a 1, 2, or 3. If an infant is manipulating one object code a 1 even if infant is simultaneously reaching for or looking at another object, i.e., a 1 code takes precedence over a 2 or 3. If an infant is reaching for or approaching an object code a 2 even if infant is simultaneously looking at another object, i.e., a 2 code takes precedence over a 3. Only if an infant is not doing anything else with an object except looking at it is a 3 code used.

For example:

(a) If infant is engaging in social play with an object and is also manipulating another object, code the social interaction (0).

(b) If infant is manipulating one object and looking at another object, code the manipulation.

MATERNAL PROXIMITY TO INFANT

Maternal Proximity is entered initially and again whenever the distance between mother and infant changes.

Definition: This code indicates the existence of one of four mutually exclusive and exhaustive categories of distance between mother and infant. Proximity is entered intially and only when a change in proximity is observed. If the proximity change results from movement by the infant, the new proximity code will have a 6 as the 3rd digit.

Rules:

1. If both mother and infant simultaneously move to cause a proximity change, code the infant as "initiating" this change (that is, use a 6 as the 3rd digit).

HOLDS INFANT/PROVIDES MAJOR POSTURAL SUPPORT

Definition: Mother supports infant's weight either at some distance from her body or close to her body, using both hands and/or her body.

Rules:

1. Includes mother's supporting an infant while holding infant in seated position on her lap, supporting infant on her hip, or supine or prone on her outstretched arms.
2. Includes cuddling, cradling, throwing in air, or simple holding.
3. Includes providing major postural support to infant while infant is in bath tub, on couch, etc.

MOTHER WITHIN ARM'S REACH OF INFANT

Definition: Mother is touching infant or part of infant's body, clothing, or covering or is located such that she can touch the infant by bending, stooping, or reaching out. Arm's reach refers to mother's arm's reach.

APPENDIX B

DYAD Computer Program

Written by Susan Falsey

```
C
C       MAJOR VARIABLE AND ARRAY NAMES
C
C        NAME              HEADING
C        FILES(20)         HOLDS NAME (DEVICE:NAME.EXT) OF FILE BEING READ
C                            OBSERVATION RECORD FOR 1 DYAD
C        IHOLD(7)          1-3 CONTAIN CODES FOR SETTING, STATE, AND
C                            PROXIMITY (S,S,P)
C                          4-5 HOLD MOTHER AND INFANT BEHAVIOR CODES
C                          6-7 HOLD OBJECT CODE FOR MOTHER AND INFANT
C        ILAST(7)          SAME POSITIONS AS IHOLD CODES BUT CONTAINS THE
C                            TIME OF LAST CHANGE OF  BEHAV. OBJECT, S,S,OR P
C                            CHANGE
C        LAST(12)          1-6 HOLDS MOTHER (1-3) & INFANT (4-6) TIME
C                            OF LAST BEHV. X S,S, OR P CHANGE
C                            7-12 SAME BUT FOR BEHAV.-OBJ. X S,S, OR P
C        INLAST(2)         HOLDS FOR MOTHER AND INFANT, TIME OF LAST CROSS
C                            TAB CHANGE OF STATE X PROX X BEHAV. X OBJ. CHNG
C        IFREQ(2,500)      HOLDS, FOR MOTHER AND INFANT, 50 ROWS (BEH.(10) X
C                            OBJECT(3-OBJ, NO OBJ., IGNORE OBJ)) X
C                            16 COLUMNS
C                              1ST COL. IGNORES S, S, & P
C                              THEN 5 EACH FOR S, S, AND P (4 CODES + TOT
C                              FOR EACH)
C                          FREQUENCY OF ONSET
C        IDUR(2,500)       SAME AS IFREQ BUT FOR DURATIONS IN EACH CELL
C        KFREQ(15)         S, S, AND P FREQ. OF ONSETS (SAME AS 15 COL. IN
C                            IFREQ- BUT IGNORES BEHAVIOR AND OBJECT)
C        KDUR(15)          SAME AS KFREQ BUT DURATIONS
C        JFREQ(2,240)      SAME AS IFREQ BUT ONLY 15 ROWS (5 CATEGORIES X
C                            3 OBJECT), SAME COLUMNS AS IFREQ
C                          FREQUENCY OF CATEGORY X OBJECT X S, S, OR P ONSET
C        IMIAC(2016)       HOLDS 14 12X12 MATRICES FOR M AND INFANT
C                            ANTECEDENT-CONSEQUENT  BEHAVIORS TO VOCAL OR
C                            CRY ONSETS, FREQUENCIES OF ANT-CONSEQ, PATTERNS
C                          STRUNG OUT INTO  AN ARRAY BECAUSE UNEQUAL NUM.
C                            OF ONSETS FOR MOTHER AND INFANT
C                            MOTHER--5 VOC. PATTERN, 1 CATEGORY VOC ONSET
C                            INFANT-- 4VOC, 2 CRY PATTERN, 1 VOC 1CRY
C                              CATEGORY ONSETS
C                          ALSO STRUNG OUT BECAUSE OF FASTER COMPUTING TIME
C                            FOR COLLAPSING AND INDEXING INTO AN ARRAY
C        LMIAC(2016)       SAME AS IMIAC BUT HOLDS LATENCIES OF CONSEQUENTS
C        INOUT(2,210)      HOLDS FOR MOTHER AND INFANT, STATE X PROX X BEHAV
C                            OBJECT CROSS TAB DURATIONS
C                            FOR MOTHER AND INFANT
C                              30 ROWS (10 BEH X 3 OBJ)
C                              7 COL. 6 FOR STATE (ACT, QUIET) X PROX (IN,
C                               OUT) COMBINATION, TOTALS UNDER EACH STATE
C                               AND 1 OVERALL TOTAL .
C        NOUT(7)           TOTALS FOR STATE X PROX (IGNORES BEHAVIOR-OBJ)
C        ICAT(2,40)        FOR MOTHER AND INFANT..
C                            BY 8'S HOLDS BEHAVIOR CODES ASSOCIATED W/ EACH
C                            OF THE 5 CATEGORIES
C                            2(M-I) X 5(CAT) X 8(BEHAV. ASSOC. W/CAT)
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C       LHOLD(2,10)     FOR MOTHER AND INFANT   ..
C                         1ST 5 HOLD 1= PRESENCE OF CATEGORY IN BEHAV
C                                    0=  ABSENCE OF CATEGORY
C                         2ND 5 HOLD OBJECT CODE ASSOCIATED W/ EACH OF
C                           OF THE 5 CATEGORIES 0=OBJ PRES., 1= NO OBJ
C       JHOLD(2,10)     SAME AS LHOLD, USED TO COMPARE PRESENT BEHAV.
C                         CODE CONVERTED TO CATEGORIES W/ PREVIOUS ONE
C       MVOC(2,6)       HOLDS MOTHER AND INFANT VOCAL AND CRY BEHAVIOR
C                         CODES -USED IN IAC TO DETERMINE VOCAL OR CRY
C                         ONSETS
C       ITRAN(7,7)      FREQUENCY TRANSITION MATRIX (USED IN MATS)
C       LTRAN(7,7)      FREQUENCY OF ENTERING AN N TO N+1 CELL  (MATS)
C       JTRAN(7,7)      FREQUENCY OF REMAINING IN A CELL AFTER ENTERING
C                         FROM N (USED IN MATS)
C       SEXT(7,7)       ITRAN SUMMED OVER ALL DYADS IN A RUN
C       MAG             DEVICE NUMBER FOR FILES
C       KARDS           DEVICE NUMBER FOR CARD READER
C       LINES           DEVICE NUMBER FOR LINE PRINTER
C       ICOL            NUMBER OF OBJECT ROWS (5)
C       N16           NUMBER OF COLUMNS FOR S, S, AND P + TOTAL IN IFREQ
C                         ETC.
C       N48             NUMBER OF COLS. X OBJECT ROWS FOR 1 BEHAVIOR IN
C                         IFREQ, ETC.
C       NCAT            NUMBER OF CATEGORIES (5)
C       NCAT8           MAX. NUMBER OF BEHAVIORS ASSOCIATED W/ A CATEGORY
C       KKCOL           NUMBER OF COLUMNS (4) FOR A S, S, OR P + IT'S TOT
C       N, ICL, IDUM,   USED TO DETERMINE PLACEMENT OF CODES IN SUB. FILL
C        NHALT, IFLOW          , REFILL, MATS.
C
C      NAMES USED IN PRINTING HEADINGS --PNAME,CNAME,DNAME,DYAD,TYPE,
C        OBJ,OUT,TOT,ACTOR
C
C      FILES USED
C        1 HOLDS ANTECEDENT CONSEQUENTS TO MOTHER VOCAL ONSET (SEE IAC)
C        2  SAME AS 1 BUT FOR INFANT ONSETS
C       NUM(2) HOLDS RECORD NUMBER FOR EACH FILE
C      SUBROUTINES REQUIRED : ZERSET, SEP, ITOJ, MATP, MATC,  FILL, STATE
C        REFILL, MATS, IAC,  FOR COMPUTATION
C        FOR PRINTING-- WR1, WRA, WR2, WR3, WR4, WR5
C       ALSO USES  SYSTEM SUBS, SLITERR, AND ASSIGN
C
C      ARITHMETIC FUNCTION ISUM
C          STRINGS OUT A ROW AND COLUMN ENTRY FOR A "MATRIX" INTO
C          1 NUMBER IN AN ARRAY
C
0001           COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
              1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
              2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
              3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0002           COMMON INOUT(2,210)
0003           DIMENSION ATRAN(7,7), INLAST(2)
0004           DIMENSION ACTOR(4),TYPE(4),OBJ(9),DYAD(2),ICAT(2,40),OUT(4),TOT(4)
              1 ,MVOC(2,6),NUM(2),ILAST(7),IHOLD(7),JHOLD(2,10),LHOLD(2,10),
              2 IROW(2),KCOL(3),CT(2),ADUM(7,7)  ,SEXT(7,7)
0005           BYTE FILES(20)
0006           DATA ACTOR, TYPE, OBJ/'MOTH','ER  ', 'INFA','NT  ','PATT','ERN ','
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          1CATE','GORY','OBJE','CT  ','    -','NO O','BJEC','T  -','OVER',
          2'ALL ','    -'/
0017          DATA DUG1,DUG2/'     ','SUMS'/
0018          DATA ICAT/1,1,4,4,6,5,7,7,9,7*0,2,2,3,3,4,4,6,5,7,10,8,0,9,0,10,0,
          13,3,6,5,8,7,9,8,8*0,7,9,8,10,9,0,10,9*0,5,6,14*0/
0019          DATA OUT, TOT, MVOC/' NOT','HER ','OUT ','    ',' TOT','ALS ','
          1 ','    ',1,1,4,4,6,5,7,7,9,9,0,10/
0020          DATA CT/' IPL',' CRY'/
0021          ISUM(IA,JA,KA) = (IA - 1) * JA + KA
          C----  SET COMPUTER TO IGNORE DIVISION BY 0
0022          CALL SETERR(5,-1)
          C----  SET CONSTANTS
0023          N16 = 16
0024          ICOL = 3
0025          ICOL1 = 0
0026          KKCOL = 5
0027          IKCOL = KKCOL + ICOL
0028          NCAT = 5
0029          NCAT6 = 6
0030          KARDS = 8
0031          JAC1 = 2
0032          MAG = 4
0033          LINES = 5
0034          IF (LINES .EQ. 5) GO TO 9001
          C----  FORCE IN FORMAT ROUTINES THAT ARE USED IN OVERLAYS IN THE
          C----    PROGRAM BUT NOT IN THE ROOT SEGMENT
0035          WRITE(LINES,9000)  ADUM(1,1), I
0036       9000 FORMAT(2X,F6.5,<J>I5,A4,I3)
0037       9001 CONTINUE
          C----  READ IN NUMBER OF DYADS, OPTIONS FOR PRINTING, AND STEP SIZE
          C----    FOR TRANSITION MATRIX-- NS, JAM, NSTEP
0038          READ(KARDS,300) NS, JAM, NSTEP
0039        300 FORMAT(5I4)
          C----  READ IN PATTERN NAMES FROM CARDS
0040          READ (KARDS,6) ((PNAME(I,J), J = 1,40), I = 1,2)
0041          6 FORMAT (20A4)
          C----  READ IN CATEGORY NAMES FROM CARDS
0042          READ(KARDS,6) ((CNAME(I,J), J = 1,20), I = 1,2)
          C-----
          C----  DO WHOLE PROCESS FOR EACH DYAD
          C-----
0043          DO4400 MSUBS = 1,NS
          C----  READ IN NAME OF DISK FILE FOR DYAD
0044          READ(KARDS,301) (FILES(J),J=1,20)
0045        301 FORMAT(4X,20A1)
          C----  ASSIGN UNIT 4 TO THAT FILE   ....  MAG = 4
0046          CALL ASSIGN(MAG,FILES,20,IERR)
          C----  REDEFINE FILE FOR ANTECEDENT-CONSEQUENT CHART..THEY ARE CLOSED
          C----    AFTER AN "ENDFILE" OF ANY FILE OCCURS
0047          DEFINE FILE 1(1000,17,U,NO)
0048          DEFINE FILE 2(1000,17,U,JFO)
          C----  CALL SUB ZERSET TO ZOUT OR RESET NEEDED MATRICES AND ARRAYS
0049          CALL ZERSET
          C----  RESET VALUES NOT PASSED INTO ZERSET
0050          DO 2 J = 1,2
0051        2 NUM(J) = 0
```

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0042            ICRY1 = 0
0043            J = 10
0044            IDUM = 0
0045            ICL = 10
0046            IHALT = -500
0047            IFLOW = -500
                C----   NOW WILL BE READING FROM THE ASSIGNED FILE
                C----   READ TITLE FOR DYAD
0048            READ (MAG,5) DYAD
                C----   PRINT HEADING FOR LISTING TIME VIOLATIONS IN RECORD
0049            WRITE(LINES,500)        DYAD
0050          500 FORMAT('1 60-SECOND VIOLATIONS FOR DYAD NO. ',2A4,' FOLLOW')
0051            WRITE(LINES,526)
0052          526 FORMAT(/'     CODE     TIME'/1X,15('-'))
0053            5 FORMAT (2A4)
                C----   READ 1ST ENTRY, (AN UNNEEDED "777" ) ALSO USED TO READ  OVER
                C----     AN "999" AFTER A BREAK IN THE RECORD (AN "888")
0054           19 READ (MAG,25) JUNK
                C----   COLLECT 1ST 5 RECORDS, EITHER AT THE BEGINNING OF AN OBSERVATION
                C----     OR AFTER A HALT (EITHER A STOP OR WHEN "OTHER" REPLACES MOTHER)
0055           20 DO 30 I = 1,5
0056              READ (MAG,25) ICODE, NOW
0057           25 FORMAT(2I5)
                C----   CALL SEP TO SEPARATE A 2- OR 3-DIGIT NUMBER INTO 3 SEP. NUMBERS
0058           26 CALL SEP(ICODE,I1,I2,I3)
                C----   IF "OTHER" (I1=7) GO BACK AND RESTART LOOP, OTHERWISE COLLECT
                C----     VALUES FOR IHOLD
0059              IF (I1 - 7) 27,20,20
                C----   I2 CONTAINS THE CODE FOR THE ENTRY DESIGNATED BY THE 1ST DIGIT
0060           27 IHOLD(I1) = I2
                C----   IF I1 = 4 OR 5, 3RD DIGIT CONTAINS THE OBJECT CODE- SO PLACE IT
0061              IF (I1 .EQ. 4 .OR. I1 .EQ. 5) IHOLD(I1+2) =I3
                C----   IF FOUND A MOTHER CODE (I1=4) DURING A "OTHER" HALT (IHALT=3)
                C----     BREAK OUT OF THE LOOP AND USE THE VALUES COLLECTED
0062              IF (I1 .EQ. 4 .AND. IHALT .EQ. 3) GO TO 31
                C----   IF "OTHER" HALT KEEP W/IN THE LOOP UNTIL CAN BREAK OUT
0063              IF (IHALT - 3) 30,20,20
0064           30 CONTINUE
0065           31 DO 35 I = 1,7
                C----   SET TIME = TIME FOR LAST ENTRY COLLECTED
0066           35 ILAST(I) = NOW
                C----   NLAST- TIME USED FOR FILLING IN MAT
0067              NLAST = NOW
0068              DO 40 J = 1,2
                C----   ILAST-- TIME FOR STATE X PROX X BEHAV-OBJECT MATRIX
0069              ILAST(J) = NOW
                C----   IROW(0/1) INDEX INTO ROW FOR BEHAVIOR BY OBJECT FOR MOTHER/INFANT
0070              IROW(J) = ISUM(IHOLD(J+3),ICOL,IHOLD(J+5)+1)
                C----   CALL ITOJ TO GET ARRAY OF CATEGORY PRESENCE IN THE BEHV. PATTERN
0071           40 CALL ITOJ(IHOLD(J+3),IHOLD(J+5),IHOLD,J,ICAT)
                C----   KCOL  - INDEX INTO WHICH 3 COLS OF SETTING, STATE, AND PROX COL
                C----     ARRAY
0072              DO 45 I = 1,3
0073           45 KCOL(I) = ISUM(1,KKCOL,IHOLD(I)+1)
                C----   SET TIME FOR CROSS-TAB CHANGES
0074              DO 46 I = 1,12
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0075        46 LAST(I) = NOW
           C----  RESET HALT TO 0
0076        47 IHALT = 0
           C----
           C----  AFTER COLLECTING  FOR WHOLE  IHOLD ARRAY- START GETTING CHANGES
           C----  READ IN CODE AND TIME
0077        48 READ (MAG,25) ICODE, NOW
           C----  SET  FOR NUMBER OF TIMES TO DEAL WITH THIS TIME ENTRY
           C----   GENERALLY DEALT W/ ONCE BUT  FOLLOWING LINES SHOW THE EXCEPTION
0078           IREDO = 0
0079           IF (IHOLD(3)) 399,360,399
           C----  IF M-OUT (IHOLD(3)=0) THEN CHECK FOR VIOLATION OF THE SETTING
           C----  CODE--IF STILL OUT AFTER 60 SEC. SETTING SHOULD BE = 3 (NO CARE)
0080       360 IF (NOW - LAST(1) .GE. 60 .AND. IHOLD(1) .NE. 3) GO TO 361
0081           GO TO 399
           C----  IF THERE WAS A VIOLATION, 1ST PRINT OUT CODE ENTERED AFTER 60 SEC
           C----    ELAPSED; SET IREDO SO WILL GO THROUGH TWICE, AND FORCE IN AN
           C----     INTERVENING CHANGE OF CODE 13 (SETTING-NO CARE) 60 SEC.
           C----     AFTER MOTHER LEFT; HOLD ACTUAL TIME ENTERED IN ITEMP, (THE
           C----     ACTUAL CODE REMAINS IN ICODE AND WILL BE RETRANSLATED LATER)
0082       361 IREDO = 1
0083           WRITE(LINES,525) ICODE,NOW
0084       525 FORMAT(2I6)
0085           ITEMP = NOW
0086           NOW = LAST(3) + 60
0087           I1 = 1
0088           I2 = 3
           C----  GO STRAIGHT TO SETTING CHANGE (NO NEED TO GO THROUGH STATE X ETC.
           C----    CROSS TAB BECAUSE SETTING IS NOT CONSIDERED THERE)
0089           GO TO 403
0090       399 CONTINUE
           C----  IF ENTRY = 888 THERE IS A BREAK IN THE RECORD
0091        49 IF (ICODE - 888) 50,65,50
           C----  IF ENTRY = 000 THEN END OF FILE FOR THIS DYAD
0092        50 IF (ICODE) 55,66,55
           C----  SEPARATE CODE INTO 3 DIGITS
0093        55 CALL SEP(ICODE,I1,I2,I3)
           C----  IF SETTING CHANGE (I1=1) DO NOT CALL STATE
0094           IF (I1 .EQ. 1) GO TO 403
0095           IF(IHOLD(2) - 2)400,402,402
           C----  IF STATE(IHOLD(2) IS ASLEEP(0) OR DROWSY(1) DO NOT CALL STATE
           C----   BUT UPDATE TIME INLAST
0096       400 DO 401 K = 1,2
0097       401 INLAST(K) = NOW
0098           GO TO 403
           C----  CALL STATE TO GET CROSS-TAB OF STATE X PROX. X BEHAVIOR
           C----  FOR MOTHER AND/OR INFANT
0099       402 CALL STATE(I1,I2,IHOLD,NOW,INLAST,IHALT)
0100       403 CONTINUE
           C----  IF I1 = 7 THEN "OTHER" HAS REPLACED MOTHER-GO TO 67 TO SET UP
           C----    APPROPRIATE HALF CONDITIONS
0101           IF (I1 - 7) 60,67,67
           C----  IF I1<4 THEN ENTRY IS FOR SETTING, STATE, OR PROX, >4 FOR M. / I.
0102        60 IF (I1 - 4) 90,120,120
           C----  W/ TIME BREAK IN RECORD, SET IHALT=1, I1=0 TO GIVE COMPLETE FILL
           C----    FOR MOTHER AND INFANT IN SUBROUTINE STATE
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0103        85 IHALT = 1
0104           I1 = 0
0105           CALL STATE(I1,I2,IHOLD,NOW,NLAST,IHALT)
0106           GO TO 70
      C-----  W/ END OF RECORD, SET IHALT=2, I1=0 FOR COMPLETE FILL IN STATE
0107        86 IHALT = 2
0108           I1 = 0
0109           CALL STATE(I1,I2,IHOLD,NOW,NLAST,IHALT)
0110           GO TO 70
      C-----  "OTHER" REPLACED MOTHER, SET IHALT = 3 (HAS ALREADY BEEN TO STATE
0111        87 IHALT = 3
      C-----
      C-----  FOR ALL HALTS, A COMPLETE FILL OF THE MATRICES FOR SETTING,
      C-----   STATE, AND PROX.--MOTHER AND INFANT IS NECESSARY.
      C-----  SO SET IA AND IB TO GO THROUGH LOOP 3 X, AND JT TO FILL IN
      C-----     BEHAVIOR X OBJECT, BEHAVIOR IGNORING OBJECT, AND BEH. ALONE
0112        70 IA = 1
0113           IB = 3
0114           JT = 3
      C-----  SINCE ON HALT, WILL ALSO HAVE TO FILL IN IMAT
0115           CALL FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
      C-----  CHANGE TIME FROM LAST IMAT FILL
0116           NLAST = NOW
      C-----  IF END OF OBSERVATION (IHALT=1), WILL HAVE TO GO TO SUBS THAT
      C-----     USE IMAT FOR TRANSITIONS (MATS) AND FOR ANTECEDENT-CONSEQUENT
      C-----       (IAC)--  SO GO STRAIGHT TO 87
0117           IF (IHALT .EQ. 2) GO TO 87
      C-----  OTHERWISE, CHECK TO SEE IF IMAT IS FULL--IF SO-- USE IT IN IAC,
      C-----       AND MATS
0118        86 IF (IFLOW .LT. 0 .AND. NHALT .LT. 0) GO TO 92
0119        87 CALL MATS(N,NSTEP,IDUM)
0120           CALL IAC(NUM,ICAT)
      C-----  REFILL IMAT THROUGH SUB REFILL
0121           CALL REFILL(IFLOW,NHALT,ICL,NSTEP,IHALT)
      C-----  IF AT END OF OBSERVATION, THERE WAS AN OVERFLOW  (START IN IMAT
      C-----       AFTER 21ST RECORD--ICL>21-- THEN REDO MATS AND IAC W/ REST OF
      C-----       NEW IMAT
0122           IF (IHALT .EQ. 2 .AND.ICL .GT. 21) GO TO 87
      C----- GO TO 92 TO FILL IN FREQ. AND DURATION MATRICES AND ARRAYS FOR
      C-----   EVERYTHING
0123           GO TO 92
      C-----
      C-----  HERE IS A CHANGE IN EITHER SETTING, STATE, OR PROXIMITY (I1<4)
      C-----  IF ENTRY IS A REPEAT OF THE PREVIOUS IHOLD(I1), GO BACK AND
      C-----    COLLECT ANOTHER ENTRY-- IGNORE THIS ONE
0124        90 IF (IHOLD(I1) - I2) 91,48,91
      C-----  INDEX LOOP TO COVER ONLY THAT CHANGE -- IA AND IB = I1, JT=2 SO
      C-----   WILL DO FOR BEH IGNORING OBJECT, AND BEH. X OBJECT, NOT BEH.ONLY
0125        91 IA = I1
0126           IB = I1
0127           JT = 2
      C-----  FILL IN MATS, AND USE IF NECESSARY-- ONLY WHEN CODE IS  A PROX.
      C-----    (SETTING AND STATE NOT USED IN THESE OPERATIONS)
0128           IF (I1 - 3) 92,96,96
      C-----  W/PROXIMITY---ONLY GO IN WHEN CODE FOR MOTHER OUT
0129        96 IF (IHOLD(I1) .NE. 0 .AND. I2 .NE. 0) GO TO 92
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      C----  SAME AS ABOVE
0131     97 CALL FILL(NOW,NLAST,NHALT,IFLOW,NHALT,ICL,NSTEP,IDUM)
0131       NLAST = NOW
0132      .  IF (IFLOW .LT. 0 .AND. NHALT .LT. 0) GO TO 92
0133       CALL MATS(N,NSTEP,IDUM)
0134       CALL IAC(NUM,ICAT)
0135       CALL REFILL(IFLOW,NHALT,ICL,NSTEP,IHALT)
      C----  NT DO FOR ALL 3 (WHEN A HALT) OR ONLY FOR SPECIFIED II
0136     92 DO 101 NT = 1A,1B
      C----  FIND CORRECT COLUMN FOR SETTING, STATE, OR PROX.
0137       KOL = KCOL(NT)
      C----  GET TOTALS COLUMN FOR SETTING, STATE OR PROX.
0138       KOLT = ISUM(NT,KKCOL,KKCOL)
      C----  ADD FREQUENCIES COUNT
0139       KFREQ(KOL) = KFREQ(KOL) + 1
0140       KFREQ(KOLT) = KFREQ(KOLT) + 1
      C----  ADD INTO DURATION (PRESENT TIME - LAST TIME THAT CODE CHANGED)
0141       KDUR(KOL) = KDUR(KOL) + (NOW - ILAST(NT))
0142       KDUR(KOLT) = KDUR(KOLT) + (NOW - ILAST(NT))
      C----  I    DO FOR BOTH MOTHER AND INFANT
0143       DO 100 I = 1,2
      C----  INDEX IN WHICH M/I X SET/STATE/PROX/  TIME TO USE
0144       NJ = ISUM(I,5,NT)
      C----  GOING INTO SUB MATP NEED...
      C----     JT= NUM. TIMES TO GO THRU LOOP IN MATP
      C----     I  MOTHER OR INFANT
      C----     KOL  WHICH SETTING, STATE, OR PROXIMITY COL.
      C----     KOLT  TOTAL COL. FOR  GIVEN KOL
      C----     ICOL1  1ST COL. OF BEH X OBJECT (IGNORES SET/STATE/PROX.
      C----     IROW(I)  WHICH BEHAV. X OBJECT ROW FOR MOTHER OR INFANT
      C----     NOW  PRESENT TIME
      C----     LAST(NJ+6) TIME OF LAST PARTICULAR M/I X SET/STAT/PROX.
      C----        CHANGE ("/" INDICATES ONLY 1 USED)
      C----     ILAST(I+5)  TIME OF LAST M/I   X OBJECT CHANGE
      C----      (IGNORING SET/STATE/PROX.)
      C----     NOTE.-- ICOL1 AND ILAST(I+5) USED ONLY WHEN JT=3 (I.E., A HALT
0145       CALL MATP(JT, I,KOL,KOLT,ICOL1,IROW(I),NOW,LAST(NJ+6),LAST(NJ+6),
          1ILAST(I+5))
      C----  JROW INDEX INTO BEH ROW IGNORING OBJECTS
      C----  SAME AS PREVIOUS MATP CALL EXCEPT TIMES ARE FOR IGNORING OBJECT
      C----    BEHAVIOR ROW
0146       JROW = ISUM(IHOLD(I+3),ICOL,ICOL)
0147       CALL MATP(JT,I,KOL,KOLT,ICOL1,JROW,NOW,LAST(NJ),LAST(NJ),
          1 ILAST(I+3))
      C----  CHECK FOR PRESENCE OF EACH CATEGORY AND ADD INTO FREQ. MATRIX
      C----   THROUGH SUB MATC (SINCE WORKING ON A HALT OR BACKGROUND CHANGE
      C----    BOTH BEH X OBJECT AND BEHAVIOR IGNORING OBJECT ROWS ARE FILLED)
0148       DO 100 J = 1,5
0149       IF(JHOLD(I,J)) 100,100,95
0150     95 JROW = ISUM(J,ICOL,ICOL)
0151       CALL MATC(JT,I,KOL,KOLT,ICOL1,JROW)
0152      .  JROW = ISUM(J,ICOL,JHOLD(I,J+5)+1)
0153       CALL MATC(JT,I,KOL,KOLT,ICOL1,JROW)
0154    100 CONTINUE
      C----  RESET JT = 2 AFTER 1ST RUN THRU LOOP SO WILL NOT TRIPLE
      C----    ENTRIES INTO ICOL1 (JUST BEHVIOR COLUMN -IGNORING SETTING, ETC.
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0155       101 JT = 2
          C---- IF NO HALT (IHALT = 0) GO TO SECTION TO RESET VALUES (110)
0156            IF (IHALT) 110,110,105
          C---- IF IHALT =1-A BREAK IN RECORD-GO TO 19 TO READ "999", THEN
          C----   RESTART BY COLLECTING VALUES FOR IHOLD.
          C---- IF IHALT = 2 - END OF OBSERVATION- GO TO 235 TO START PRINTING
          C---- IF IHALT = 3 -"OTHER" REPLACED MOTHER- GO TO 20 TO READ NEXT
          C----   RECORD (IT'S A VALID ENTRY) AND COLLECT IHOLD UNTIL MOTHER
          C----   REENTERS (I1=4)
0157       105 GO TO (19,235,20), IHALT
          C---- NO HALT- SO RESET APPROPRIATE COLUMN INDEX TO NEWLY ENTERED VALUE
          C---- RESET IHOLD(I1), AND ALL NEEDED TIMES FROM PREVIOUS ENTRY TO NEW
0158       110 KCOL(I1) = ISUM(I1,KKCOL,12+1)
0159           IHOLD(I1) = 12
0160           DO 111 I = 1,2
0161           NJ = ISUM(1,3,I1)
0162           LAST(NJ) = NOW
0163       111 LAST(NJ+6) = NOW
0164           ILAST(I1) = NOW
          C---- IF IREDO = 0- GO BACK AND READ NEXT RECORD
0165           IF(IREDO) 47,47,102
          C---- IF THERE HAD BEEN A 60-SEC. VIOLATION, RESET TIME TO ONE ENTERED
          C----   ORIGINALLY, AND GO BACK, DECODE ICODE, AND COMPLETE
          C----    THE PROCEDURE FOR THAT ACTUAL ENTRY
0166       102 NOW = ITEMP
0167           IREDO = 0
0168           GO TO 49
          C-----
          C---- JJJJJ CHANGE IN MOTHER OR INFANT - BEHAVIOR OR OBJECT CODE
          C---- SET IM = 1 OR 2 FROM ORIG 4 OR 5 OF MOTHER OR INFANT, RESPECTIVLY
          C---- JT = 3 SO WILL INCLUDE ICOL1 IN CALL TO MATP (AS IN ABOVE)
0169       120 IM = I1 - 3
0170           JT = 3
          C---- CONVERT PRESENT RECORD INTO CAT. ARRAY JHOLD
0171           CALL ITOJ(I2,I3,JHOLD,IM,ICAT)
          C---- CHECK IF BEHAVIOR CHANGE
0172           IF (IHOLD(I1) - I2) 130,125,130
          C---- IF NOT BEHAVIOR CHANGE, CHECK FOR OBJECT CHANGE
          C----   IF NEITHER, IT'S A REPEAT SO READ NEXT RECORD
0173       125 IF (IHOLD(I1 + 2) - I3) 126,48,126
          C---- IT WAS AN OBJECT CHANGE SET = 1 FOR BEH, IOBJ, & CAT, IOB
          C---- KST USED LATER FOR CHANGING TIMES, SET SO CHANGE ONLY OBJECT ONES
0174       126 IOBJ = 1
0175           IOB = 1
0176           KST = 7
0177           GO TO 145
          C---- WAS A BEHAVIOR CHANGE
          C---- CHECK ALSO FOR OBJECT CHANGE FROM PREVIOUS BEHAVIOR - USED W/
          C----   CATEGORY X OBJECT CHANGE
          C---- KST = 1 SO START CHANGING TIMES FROM BEHAVIORS AND THEN OBJECTS
0178       130 IOBJ = 0
0179           IOB = 0
0180           IF (IHOLD(I1+2) .NE. I3) IOB = 1
0181           KST = 1
          C---- I DO FOR EACH OF THE SETTING, STATE, AND PROX, COLUMN INDICES
0182       145 DO 200 I = 1,3
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      C----  K = INDEX INTO WHICH SET/STAT/PROX/  TIME TO USE
0183          K = ISUM(IM,3,1)
      C----  GET CODE FOR SET/STATE/OR PROX COLUMN
0184          KOL = KCOL(I)
      C----  TOTAL COL. FOR ABOVE
0185          KOLT = ISUM(I,KKCOL,KKCOL)
      C----  MATP USED SAME WAY AS ABOVE
      C----  CALLING MATP TO ADD INTO MATRICES FOR  BEHAVIOR X OBJECT CHANGE
      C----    AND FOR THAT ROW TOTAL (ICOL1)
0186          CALL MATP(JT,IM,KOL,KOLT,ICOL1,IROW(IM),NOW,LAST(K+6),LAST(K+6),
             1ILAST(I1+2))
      C----  IF OBJECT CHANGE ONLY- DO NOT CALL MATP FOR BEHAVIOR IGNORING
      C----    OBJECT ROW
0187          IF (IOBJ) 150,150,155
      C----  WAS A BEHAVIOR CHANGE-- SO DO CALL MATP FOR THAT ROW
0188        150 JROW = ISUM(IHOLD(I1),ICOL,ICOL)
0189          CALL MATP(JT,IM,KOL,KOLT,ICOL1,JROW,NOW,LAST(K),LAST(K),ILAST(I1))
      C----  NOW CHECKING FOR CATEGORY CHANGE
0190        155 DO 200 J = 1,5
      C----  IF OBJECT CHANGE AND CATEGORY STILL PRESENT GO TO 195
0191          IF (IOB .EQ. 1 .AND. LHOLD(IM,J) + JHOLD(IM,J) .EQ. 2) GO TO 195
      C----  IF CATEGORY ABSENT IN PRESENT CODE BUT WAS PRESENT GO TO 195
0192          IF (JHOLD(IM,J) .EQ. 0 .AND. LHOLD(IM,J) .EQ. 1) GO TO 195
      C----  SKIP OVER THIS CATEGORY
0193          GO TO 200
      C----  195 CALL MATC FOR CATEGORY BY OBJECT ROW
0194        195 JROW = ISUM(J,ICOL,LHOLD(IM,J+5)+1)
0195          CALL MATC(JT,IM,KOL,KOLT,ICOL1,JROW)
      C----  CHECK FOR CATEGORY CHANGE- IF SO 196 WILL FILL IN MATC FOR CAT
      C----    IGNORING OBJECT ROW, OTHERWISE SKIP TO NEXT CATEGORY
0196          IF (JHOLD(IM,J) .EQ. 0 .AND. LHOLD(IM,J) .EQ. 1) GO TO 196
0197          GO TO 200
      C----  196 CALL MATC FOR CATEGORY CHANGE IGNORING OBJECT ROW
0198        196 JROW = ISUM(J,ICOL,ICOL)
0199          CALL MATC(JT,IM,KOL,KOLT,ICOL1,JROW)
0200        200 CONTINUE
      C----  RESET JT TO 2 TO PREVENT TRIPLE ENTRY INTO BEHAVIOR TOTALS ROW
      C----    (ICOL1 IGNORING SETTING, STATE, AND PROXIMITY)
0201        208 JT = 2
      C----  PLACE NEW CATEGORY CODES INTO LHOLD (OLD PREVIOUS CATEGORIES)
0202          DO 202 J = 1,10
0203        202 LHOLD(IM,J) = JHOLD(IM,J)
      C----  IF IT WAS AN OBJECT CHANGE, DON'T FILL IN IMAT
0204          IF (IOBJ) 201,201,205
      C----  BEHAVIOR CHANGE SO FILL IN IMAT, AND SAME PROCEDURES AS USED
      C----    ABOVE WITH HALTS
0205        201 CALL FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
0206          NLAST = NOW
0207          IF (IFLOW .LT. 0 .AND. NHALT .LT. 0) GO TO 205
0208          CALL MATS(N,NSTEP,IDUM)
0209          CALL IAC(NUM,ICAT)
0210          CALL REFILL(IFLOW,NHALT,ICL,NSTEP,IHALT)
      C----  CHANGE APPROPRIATE BEHAVIOR X OBJECT ROW
0211        205 IROW(IM) = ISUM(I2,ICOL,I3+1)
      C----  CHANGE APPROPRIATE TIMES  M-BEH SET/STAT/PROX=1-3, I'S 4-6
      C----                      M-BEH X OBJ S/S/P =7-9, I'S 10-12
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0212            K = 1
0213            IF (KST .EQ. 1) K = 2
0214            IF (IM .EQ. 2)  KST = KST + 3
0215            DO 215 I = 1,K
0216            DO 1217 II = 1,3
0217            LAST(KST) = NOW
0218         1217 KST = KST + 1
0219          215 KST = KST + 3
          C----  CHANGE BEHAVIOR X OBJECT CODE IN IHOLD, AND TIME
0220            IHOLD(II+2) = IB
0221            ILAST(II+2) = NOW
          C----  IF IT WAS AN OBJECT CHANGE - GO BACK TO NEXT RECORD
0222            IF(IOBJ) 216,216,47
          C----  IF BEHAVIOR CHANGE- CHANGE BEHAV IHOLD AND TIME
0223          216 ILAST(II) = NOW
0224            IHOLD(II) = I2
          C----  GO BACK AND READ NEXT RECORD
0225            GO TO 47
          C-----
          C----  HAVE FINISHED COLLECTING INFORMATION FOR THE DYAD - END OF RECORD
          C-----
          C----  SET PAGE NUMBER TO 0 AND CHECK FOR PRINTING OPTIONS
0226          235 IPAGE = 0
          C----  IF JAM = 0, ALL INFORMATION WILL BE PRINTED
0227            IF (JAM) 6001,6001,6008
          C----  IF OPTION SPECIFIED- GO TO THAT OPTION
0228         6008 GO TO (6001,6000,6002,6003,6004), JAM
          C----  WR1 FOR  FREQUENCY AND DURATION MATRICES AND ARRAYS FOR M-I
          C----    BEHAVIOR-OBJECT  X SETTING, STATE, AND PROXIMITY, ANALYSES BY
          C----    PATTERN AND BY CATEGORY, AND A SUMMARY ANALYSIS
0229         6001 CALL WR1(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,OUG2)
          C----  WRA PRINTS CROSS-TAB OF M-I BEHAVIOR-OBJECT X PROX(IN-OUT) X
          C----    STATE(QUIET-ACTIVE), ANALYSES BY PATTERN AND BY CATEGORY
          C----    DURATIONS
0230         6000 CALL WRA(DYAD,ACTOR,TYPE,OBJ,ICAT,TOT)
0231            IF (JAM .GT. 0) GO TO 4400
          C----  WR2 PRINTS MATRICES OF ANTECEDENT-CONSEQUENT BEHAVIORS TO
          C----    VOCAL AND CRY ONSETS, FREQUENCIES AND CONSEQUENT LATENCIES,
          C----    ANALYSES BY PATTERN AND CATEGORY
0232         6002 CALL WR2(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,OUG2)
0233            IF (JAM .GT. 0) GO TO 4400
          C----  WR3 PRINTS OUT MATRICES OF DISTRIBUTION OF LATENCIES TO
          C----  VOCAL ONSETS
0234         6003 CALL WR3(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,OUG2)
          C----  WR5 PRINTS OUT THE TRANSITION MATRICES
0235         6004 CALL WR5(DYAD,ADUM,NSTEP,SEXT,NS)
          C----  CLOSE THE FILE FOR THE DYAD
0236         4400 ENDFILE MAG
          C----  WHEN FINISHED PROCEDURES FOR ALL DYADS, WR5 IS USED TO PRINT
          C----    TRANSITION MATRIX COLLAPSED OVER ALL DYADS
          C----  ITRAN(1,1) SET TO -1 TO       SET WR5 TO PRINT JUST 1 MATRIX
0237            ITRAN(1,1) = -50
0238            CALL WR5(DYAD,ADUM,NSTEP,SEXT,NS)
0239            CALL EXIT
0240            END

ROUTINES CALLED:
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        SETERR, ASSIGN, ZERSET, SEP    , ITOJ   , STATE , FILL
        MATS   , IAC    , REFILL, MATP   , MATC   , WK1   , WKA
        WK2    , WK3    , WK5   , EXIT

        OPTIONS =/ON,/CK,/OP:2

        BLOCK        LENGTH
        MAIN.   3145    (014222)*
        .$$$$.  8494    (041134)

        **COMPILER ----- CORE**
           PHASE        USED  FREE
        DECLARATIVES  00622 15678
        EXECUTABLES   01934 12366
        ASSEMBLY      02648 16292
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0001            SUBROUTINE ZERSET
                C---- SUBROUTINE ZERSET ZEROS OUT ELEMENTS AND ARRAYS NEEDED FOR THE
                C----  NEXT OYAO. (SEE MAINLINE FOR LISTING OF MAJOR VARIABLES AND
                C----  ARRAYS)
0002            COMMON IPAGE,LINES,N15,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
               1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
               2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
               3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003            COMMON INOUT(2,210)
0004            IPAGE = 0
0005            DO 1 I = 1,500
0006            DO 1 J = 1,2
0007            IMAT(J,I) = 0
0008            IFREQ(J,I) = 0
0009          1 IDUR(J,I) = 0
0010            DO 2 J = 1,2
0011            KPAT(J) = 0
0012            JPAT(J) = 66
0013            DO 2 I = 1,240
0014          2 JFREQ(J,I) = 0
0015            DO 3 I = 1,2016
0016            IMIAC(I) = 0
0017          3 LMIAC(I) = 0
0018            DO 4 I = 1,7
0019            DO 4 J = 1,7
0020            JTRAN(J,I) = 0
0021            LTRAN(J,I) = 0
0022          4 ITRAN(J,I) = 0
0023            DO 5 J = 1,15
0024            KFREQ(J) = 0
0025          5 KDUR(J) = 0
0026            DO 404 I = 1,2
0027            DO 404 J = 1,210
0028        404 INOUT(I,J) = 0
0029              RETURN
0030            END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK        LENGTH
        ZERSET  292     (001110)*
        .$$$$.  0494    (041134)

        **COMPILER ----- CORE**
           PHASE        USED  FREE
        DECLARATIVES  00622 13678
        EXECUTABLES   01054 13246
        ASSEMBLY      01148 17792
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FORTRAN V06.13                    10:36:52    28-JUN-74    PAGE    1

0001          SUBROUTINE SEP(ICODE,I1,I2,I3)
      C----- SUBROUTINE SEP CONVERTS A 2- OR 3-DIGIT NUMBER (ICODE) INTO 3
      C-----  NUMBERS:
      C-----    IF 1ST DIGIT = 1-5, INPUT CODE WAS FOR SETTING, STATE, OR
      C-----       PROXIMITY; VALID 2ND DIGITS = 0-5 (CREATED  3RD DIGIT UNUSED
      C-----    IF 1ST DIGIT = 5,6,OR 8 INPUT CODE WAS BEHAVIOR CHANGE
      C-----       1 SUBTRACTED FROM 1ST DIGIT FOR PROPER INDEX INTO ARRAYS
      C-----      IF 2ND DIGIT = 0, CONVERT TO 10  (BEH. CODES RUN 1-10)
      C-----      3RD DIGIT: IF ABSENT FRM ICODE FORCE TO =-1 (NO OBJECT)
      C-----       IF = 0 OBJECT PRESENT
0002          IF (ICODE .LT. 100) ICODE = ICODE * 10 + 1
0003          I1 = ICODE/100
0004          I2 = ICODE/10 - I1*10
0005          I3 = ICODE - (ICODE/10 * 10)
0006          IF (I1 - 5) 10,5,5
0007        5 I1 = I1 - 1
0008          IF (I2 .EQ. 0) I2 = 10
0009       10 RETURN
0010          END

      OPTIONS =/ON:/CK:/OP:2

      BLOCK        LENGTH
      SEP     107     (000326)*

      **COMPILER ----- CORE**
         PHASE       USED  FREE
      DECLARATIVES 00622 15678
      EXECUTABLES  00765 15517
      ASSEMBLY     00943 17997
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FORTRAN V06.13                    10:37:51    28-JUN-74    PAGE     1

0001          SUBROUTINE ITOJ(IH1,IH2,KHOLD,IM,ICAT)
      C---- SUBROUTINE ITOJ CREATES A CATEGORY MATRIX FROM INPUT OF REH. CODE.
      C----    IM ROW = MOTHER OR INFANT
      C----       COL. 1-5 1=CATEGORY PRESENT, 0 ABSENT
      C----       COL. 6-10 1 IF CATEGORY AND NO OBJECT, 0 IF CATEGORY AND OBJECT
0002          COMMON IPAGE,LINES,NIE,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION KHOLD(2,10), ICAT(2,40)
      C----  LOOK FOR REH. IN CATEGORY ARRAY
0004          DO 25 I = 1,NCAT
0005          KHOLD(IM,I) = 0
0006          KHOLD(IM,I+5) = 0
0007          IJ = (I - 1) * NCAT8
0008          DO 10 J = 1,NCAT8
0009          IJ = IJ + 1
0010          IF (IH1 - ICAT(IM,IJ)) 10,15,10
0011       10 CONTINUE
0012          GO TO 25
      C----  1 FOR PRESENCE OF CATEGORY
0013       15 KHOLD(IM,I) = 1
      C----  IH2 IS OBJECT CODE--0=OBJECT, 1=NO OBJECT
0014          KHOLD(IM,I+5) = IH2
0015       25 CONTINUE
0016          RETURN
0017          END

      OPTIONS =/ON:/LR:/OP:2

      BLOCK        LENGTH
      ITOJ     144     (000440)*
      *$$$$.   8074    (037424)

      **COMPILER ----- CORE**
         PHASE        USED  FREE
      DECLARATIVES  01051 13249
      EXECUTABLES   01025 13277
      ASSEMBLY      01076 17864
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FORTRAN V06.13                  10:45:15     28-JUN-74    PAGE     1

0001            SUBROUTINE MAIP(IN,IROW,IA1,IA2,IA3,IB,ITIME,IC1,IC2,IC3)
          C---- SUBROUTINE MAIP ADDS INTO FREQUENCY (IFREQ) AND DURATION (IDUR)
          C----    MATRICES FOR A BEHAVIORXOBJECT, OR A BEHAVIOR CHANGE
          C----          IA(I) = APPROPRIATE SETTING, STATE, AND PROX. COLUMNS.
          C----          IB = BEHAVIORXOBJECT, OR BEHAVIOR ROW
          C----          IROW = MOTHER OR INFANT
          C----          ICOL = = CROSS-TAB COLUMN OF IPXIA(II) + 1 (SHIFT OVER 1
          C----           TO ALLOW FOR 1ST COL. IGNORING BACKGROUND CHANGES)
          C----          IC(N) = PREVIOUS TIME OF CHANGE FOR APPROPRIATE COL.
          C----          IN = NUMBER OF TIMES THROUGH LOOP
          C----          ITIME = PRESENT TIME
0002            COMMON IPAGE,LINES,N16,N48,LCOL,IKCOL,KKCOL,NCAT,NCATB,KPAT(2),
                1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
                2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
                3 ,JFREQ(2,240),IM1AC(2016),LMIAC(2016),LAST(12)
0003            DIMENSION IA(3), IC(3)
0004            IA(1) = IA1
0005            IA(2) = IA2
0006            IA(3) = IA3
0007            IC(1) = IC1
0008            IC(2) = IC2
0009            IC(3) = IC3
0010            DO 20 I = 1,IN
0011            ICOL = (IB - 1) * N16 + (IA(I) + 1)
0012            IFREQ(IROW,ICOL) = IFREQ(IROW,ICOL) + 1
0013         20 IDUR(IROW,ICOL) = IDUR(IROW,ICOL) + (ITIME - IC(I))
0014            RETURN
0015            END

          OPTIONS =/ON:/CF:/OP:2

          BLOCK      LENGTH
          MAIP     168     (000520)*
          $$$$$.   8074    (037424)

          **COMPILER ----- CORE**
            PHASE        USED  FREE
          DECLARATIVES 00622 13678
          EXECUTABLES  01131 13169
          ASSEMBLY     01100 17040
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FORTRAN V06.13                    10:38:59    28-JUN-74    PAGE    1

0001          SUBROUTINE MATC(IN,IROW,IA1,IA2,IA3,IB)
              C----  SUBROUTINE MATC ADDS FREQUENCY (JFREQ) OF CATEGORYXOBJECT, OR
              C----    CATEGORY CHANGE (SEE SUB. MATP FOR VARIABLE DEFINITIONS)
0002          COMMON IPAGE,LINES,NIC,NOB,LCOL,IRCOL,KRCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KOOR(15),IMAT(2,500),IFREQ(2,500),IOOR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION IA(3)
0004          IA(1) = IA1
0005          IA(2) = IA2
0006          IA(3) = IA3
0007          DO 20 I = 1,IB
0008          ICOL = (IB - 1) * NIC + (IA(I) + 1)
0009       20 JFREQ(IROW,ICOL) = JFREQ(IROW,ICOL) + 1
0010          RETURN
0011          END

        OPTIONS =/OB,/CK,/OP:2

        BLOCK      LENGTH
        MATC    106     (000330)*
        .$$.$.  8074    (037424)

        **COMPILER ----- CORE**
           PHASE      USED  FREE
        DECLARATIVES 00622 13678
        EXECUTABLES  01051 13249
        ASSEMBLY     01064 17676
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FORTRAN V06.13                    10:40:29    28-JUN-74    PAGE    1

0001            SUBROUTINE STATE(I1,I2,IHOLD,NOW,INLAST,IHALT)
          C---- SUBROUTINE STATE FILLS IN DURATION (INOUT)OF CROSS TAB OF:
          C----   BEHAVIOR-OBJECT X IN-OUT X QUIET-ACTIVE
          C----   FOR MOTHER OR INFANT (IF BEH.-OBJ. CHANGE) OR BOTH (IF HALT IN
          C----   RECORD OR BACKGROUND CHANGE--PROX. OR STATE)
0002            COMMON IPAGE,LINES,N16,N48,LCOL,IKOL,KKCOL,NCAT,NCAT8,KPAT(2),
                1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
                2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
                3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003            COMMON INOUT(2,210)
0004            DIMENSION IHOLD(7),INLAST(2)
0005            ISUM(I3,J3,K3) = (I3-1) * J3 + K3
          C---- DO ONLY FOR QUIET AND ACTIVE   (IHOLD(2) = 2 OR 3)
0006            IF (IHOLD(2) .LT. 2) GO TO 6
          C---- IF BEHAVIOR CHANGE, THEN CHANGE MATRIX FOR ONLY 1 IN DYAD
0007            IF (I1 .GE. 4 .AND. I1 .LE. 5) GO TO 3
          C---- IF BACKGROUND CHANGE OR HALT, THEN CHANGE MATRIX FOR BOTH M AND I
          C---- SET TO START LOOP WITH MOTHER
0008            K = 4
          C---- DO LOOP 2 TIMES
0009          2 IJ = 2
0010            GO TO 4
          C---- DO LOOP ONLY ONCE, FOR APPROPRIATE PERSON (I1)
0011          3 IJ = 1
0012            K = I1
          C---- IL INDEX  FOR IN(1) / OUT(2) (IN PROX. CODES ARE 1-3,  OUT = 0)
          C---- CONVERT TO DICHOTOMY 0 = OUT(2), 1,2,3 = IN (1)
0013          4 IL = 1
0014            IF (IHOLD(3) .EQ. 0) IL = 2
          C---- INDEX INTO STATE X IN/OUT COL. TO BE USED
0015            ICOL = ISUM(IHOLD(2)-1,3,IL)
          C---- COL. FOR EITHER IN OR OUT TOTAL
0016            ICOL1 = ISUM(IHOLD(2)-1,3,3)
          C---- DO ONCE (BEH. CHANGE) OR TWICE (STATE OR PROX. CHANGE)
0017            DO 5 L = 1,IJ
          C---- M = 1, I = 2  (ACTUAL MOTHER INDEX = 4, INFANT'S = 5)   KK
0018            KK = K + 3
          C---- INDEX INTO BEHAVIOR-OBJECT ROW
0019            IROW = ISUM(IHOLD(K),3,IHOLD(K+2)+1)
          C---- INDEX INTO WHICH "ROW" OF THE ARRAY TO USE
0020            INSPOT = ISUM(IROW,7,0)
          C---- DURATION
0021            IT = NOW - INLAST(KK)
          C---- ADD INTO EXACT CELL
0022            INOUT(KK,INSPOT+ICOL) = INOUT(KK,INSPOT+ICOL) + IT
          C---- ADD INTO BEHAVIOR TOTAL FOR IN OR OUT
0023            INOUT(KK,INSPOT+ICOL1)=INOUT(KK,INSPOT+ICOL1) + IT
          C---- ADD INTO TOTAL IN OR OUT
0024            INOUT(KK,INSPOT+7)=INOUT(KK,INSPOT+7) + IT
          C---- RESET TIME FOR MOTHER OR INFANT
0025            INLAST(KK) = NOW
0026          5 K = K + 1
0027            RETURN
          C---- RESET TIME FOR BOTH MOTHER AND INFANT (IF RETURNING  W/OUT
          C----   ADDING INTO CELLS (IF STATE WAS SLEEP OR DROWSY)
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0028          6 DO 10 I = 1,2
0029         10 INLAST(I) = NOW
0030            RETURN
0031            END
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        OPTIONS =/ON,/CK,/OP:2

        BLOCK        LENGTH
        STATE   355     (001306)*
        .$$$$.  8494    (041136)

        **COMPILER ----- CORE**
           PHASE        USED  FREE
        DECLARATIVES  01054 13246
        EXECUTABLES   01183 13117
        ASSEMBLY      01288 17652
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FORTRAN V06.13                    14:07:33    28-JUN-74    PAGE    1

0001          SUBROUTINE WRA(DYAD,ACTOR,TYPE,OBJ,ICAT,TOT)
              C----  SUBROUTINE WRA PRINTS OUT MATRIX OF BEHAVIOR-OBJECT X STATE X
              C----    PROXIMITY; AND CALCULATES PROPORTIONS, ETC, FOR MOTHER AND
              C----    INFANT; FOR PATTERNS AND CATEGORIES
0002          COMMON IPAGE,LINES,N16,N48,LCOL,IKCOL,KKCOL,NCAT,NCAT3,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2*40),CNAME(2*20),
             2 ONAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IDIAC(2016),LDIAC(2016),LAST(12)
0003          COMMON INOUT(2,210)
0004          DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2*40),TOT(4),OBJ(9)
             1 , NOUT(7)
0005          DIMENSION JDUM(6), KDUM(6)
0006          DIMENSION XDUM(16)
0007          DIMENSION IMATB(1000)
0008          EQUIVALENCE(IMATB(1),IMAT(1,1))
0009          ISUM(IA,JB,KC) = (IA-1) * JB + KC
              C----  0 OUT TOTALS ROW
0010          DO 1 I = 1,7
0011        1 NOUT(I) = 0
              C----  DO FOR MOTHER AND INFANT
0012          DO 10 K = 1,2
              C----  DO FOR EACH DO FOR EACH BEHAVIOR PATTERN
0013          DO 10 J = 1,10
              C----  GET INDEX INTO WHICH BEHAVIOR TO WORK ON
0014          IROW = ISUM(J,21,0)
              C----  INDEX INTO WHICH BEH-IGNORING OBJECT ROW (NEEDS TO BE SUMMED INTO
0015          IL = IROW + 14
              C----  DO FOR BOTH BEH W/ AND W/OUT OBJECT
0016          DO 10 II = 1,2
              C----  INDEX INTO THAT ROW (OBJECT ROW)
0017          IV = ISUM(II,7,IROW)
              C----  DO FOR EACH OF THE 7 COLS. IN THAT ROW
0018          DO 10 I = 1,7
0019          M = IV + I
0020          INOUT(K,IL+I) = INOUT(K,IL+I) + INOUT(K,M)
              C----  GET ABSOLUTE ROW TOTALS (COLLAPSED OVER ALL BEHAVIORS)  DO IT
              C----    ONLY ONCE BECAUSE IT'S THE SAME FOR MOTHER AND INFANT
0021          GO TO (5,10), K
0022        5 NOUT(I) = NOUT(I) + INOUT(K,M)
0023       10 CONTINUE
              C----  ABSOLUTE DURATION = TOTAL
0024          DUR = NOUT(7)
              C----  TIME IN = ACTIVE-IN + QUIET-IN
0025          JDUM(1) = NOUT(1) + NOUT(4)
              C----  QUIET IN
0026          JDUM(2) = NOUT(1)
              C----  ACTIVE -IN
0027          JDUM(3) = NOUT(4)
              C----  TIME OUT = ACT-OUT + QUIET-OUT
0028          JDUM(4) = NOUT(2) + NOUT(5)
              C----  QUIET-OUT
0029          JDUM(5) = NOUT(2)
              C----  ACTIVE OUT
0030          JDUM(6) = NOUT(5)
              C----  DO FOR MOTHER AND INFANT
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0031            DO 100 K = 1,2
      C----      INDEX INTO ACTOR ARRAY
0032            IS = ISUM(K,2,1)
0033            IS1 = IS + 1
0034            I2 = 10
      C----      0 OUT ARRAY TEMPORARILY USED TO HOLD CATEGORIES
0035            DO 20 IJ = 1,105
0036         20 IMAT0(IJ) = 0
      C----      GET PATTERN NAMES FOR MOTHER AND INFANT
0037            DO 25 IJ = 1,40
0038         25 DNAME(IJ) = PNAME(K,IJ)
      C----      DO FOR PATTERNS, THEN CATEGORIES
0039            DO 90 JT = 1,2
      C----      INDEX INTO TYPE ARRAY (PATTERN, CATEGORY)
0040            IT = ISUM(JT,2,1)
0041            IT1 = IT + 1
      C----      DO ANALYSES INDICATED BY FORMATS 31, 35, AND 38
0042            DO 85 L = 1,3
0043            IPAGE = IPAGE + 1
      C----      PRINT INITIAL HEADING
0044            WRITE(LINES,26) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),(TYPE(JJ),JJ=IT,
               1 IT1)
0045         26 FORMAT('1  PAGE',I4,'  DYAD NO. ',2A4/3X,2A4,': ',2A4/)
      C----      PRINT ANALYSIS HEADING
0046            GO TO (30,35,37), L
0047         31 WRITE(LINES,31)
0048         31 FORMAT('   DURATION')
0049            GO TO 40
0050         35 WRITE(LINES,36)
0051         36 FORMAT('   PROPORTION OF DURATION IN EACH STATE X BEHAVIOR CATEGOR
               1Y')
0052            GO TO 40
0053         37 WRITE(LINES,38)
0054         38 FORMAT('   PROPORTION OF COLUMN DURATION ("TOT" ROW = PROP OF TOTA
               1L)')
      C----      COMPLETE HEADING
0055         40 WRITE(LINES,41)
0056         41 FORMAT(/25X,'QUIET',15X,'ACTIVE'/19X,16('-'),3X,16('-') /
               1,18X,2('    IN   OUT   TOT - '),' TOTAL '/1X,65('-'))
      C----      DO THE 3 ANALYSES FOR TOTAL ROW (MOUT ARRAY)
0057            GO TO (42,50,44), L
      C----      PRINT TOTAL DURATION
0058         42 WRITE(LINES,43) (MOUT(JJ),JJ=1,7)
0059         43 FORMAT(' TOTAL',11X,'-',3(3I6,' - '))
0060            GO TO 55
      C----      PROPORTIONS TO PERCENTAGES BY MULTIPLYING BY 100
      C----      JJ DO FOR ACTIVE AND QUIET
0061         50 DO 51 JJ = 1,2
0062            IV = ISUM(JJ,3,0)
      C----      IN EACH- THE IN-OUT ENTRIES ARE DIVIDED BY THE RESPECTIVE ROW
      C----        TOTAL FOR IN OR OUT
0063            DO 51 J1 = 1,2
0064            XD = MOUT(IV+J1)
0065         51 XOUM(IV+J1) = XD/MOUT(IV+3) * 100.
      C----      THE THIRD ROW TOTALS OF IN OR OUT ARE DIVIDED BY THE ABS
      C----      ROW TOTAL
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```
0066            DO 52 JJ = 3,6,3
0067            XD = NOUT(JJ)
0068         52 XDUM(JJ) = XD/NOUT(7) * 100.
          C---- ABSOLUTE ROW TOTAL IS DIVIDED BY ITSELF, I.E., 100.
0069            XDUM(7) = 100.
0070            WRITE(LINES,53) (XDUM(JJ),JJ=1,7)
0071         53 FORMAT(' TOTAL',11X,'-',3(3F6.1,' - '))
0072            GO TO 55
          C---- EACH COLUMN IS DIVIDED BY ROW TOTAL
0073         44 XD = NOUT(7)
0074            DO 45 JJ = 1,7
0075         45 XDUM(JJ) = NOUT(JJ) / XD * 100.
0076            WRITE(LINES,53) (XDUM(JJ),JJ=1,7)
          C---- DO FOR EACH BEHAVIOR (I2=10)  FOR PATTERNS, I2=5 FOR CATEGORIES
0077         55 DO 80 II = 1,I2
          C---- INDEX INTO BEHAVIOR NAME
0078            NA = ISUM(II,4,1)
0079            NB = NA + 3
0080            WRITE(LINES,56) (DNAME(JJ),JJ=NA,NB)
0081         56 FORMAT(1X,65('-')/1X ,4A4)
          C---- INDEX INTO WHICH BEHAVIOR (3 ROWS/BEHVIOR)
0082            JCOL = ISUM(II,21,0)
          C----   III DO FOR OBJECT, NO OBJECT, AND IGNORING OBJECT
0083            DO 70 III = 1,3
          C---- INDEX INTO OBJECT PRINTED
0084            IO = ISUM(III,3,1)
0085            IO1 = IO + 2
          C----   WHICH CELL TO BEGIN IN
0086            JCOLA = ISUM(III,7,JCOL+1)
          C----   END CELL FOR ROW
0087            JCOL1 = JCOLA + 6
          C---- SPLIT ACCORDING TO ANALYSIS
0088            GO TO (57,60,64), L
          C---- PRINT DURATION
0089         57 WRITE(LINES,58)(OBJ(JJ),JJ=IO,IO1),((INOUT(K,JJ),JJ=JCOLA,JCOL1)
0090         58 FORMAT(6X,3A4,3(3I6,' - '))
0091            GO TO 70
0092         60 MCOL = ISUM(III,7,JCOL)
          C---- SAME PRINCIPLE AS DO 51 ABOVE--  IN ROW 6/7 COLS, THE 1ST 2 COLS
          C----   ARE DIVIDED BY THE 3RD; 4TH AND 5TH / 6TH; 3 & 6 / 7 AND 7/7
0093            DO 61 JJ = 1,2
          C---- IV = WHICH GROUP OF 2
0094            IV = ISUM(JJ,3,0)
0095            DO 61 J1 = 1,2
0096            XD = INOUT(K,IV+J1+MCOL)
0097         61 XDUM(IV+J1) = XD / INOUT(K,IV+3+MCOL) * 100.
0098            DO 62 JJ = 3,6,3
0099            XD = INOUT(K,MCOL+JJ)
0100         62 XDUM(JJ) = XD / INOUT(K,MCOL+7) * 100.
0101            XDUM(7) = 100.
0102            WRITE(LINES,63)(OBJ(JJ),JJ=IO,IO1),(XDUM(JJ),JJ=1,7)
0103         63 FORMAT(6X,3A4,3(3F6.1,' - '))
0104            GO TO 70
          C---- DIVIDE EACH COLUMN BY COLUMN TOTAL
0105         64 DO 65 JJ = 1,7
0106            XD = NOUT(JJ)
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0107            XDUM(JJ) = INOUT(K,JCOLA) / XD * 100.
0108         65 JCOLA = JCOLA + 1
0109            WRITE(LINES,64) (OBJ(JJ),JJ=10,101),(XDUM(JJ),JJ=1,7)
             C----  NEXT OBJECT ROW
0110         70 CONTINUE
             C----  NEXT BEHAVIOR
0111         80 CONTINUE
             C----  NEXT ANALYSIS
0112         83 WRITE(LINES,81)
0113         81 FORMAT(1X,65('-'))
             C----  IF JUST FINISHED BY PATTERNS- DO BY CATEGORY; IF FINISHED
             C----    CATEGORIES--GO TO SUMMARY SECTION
0114            GO TO (82,91), JT
             C----  CATEGORY ANALYSIS
             C----   FOR EACH BEHAVIOR
0115         82 DO 87 I = 1,10
             C----  CHECK TO SEE IF PATTERN MATCHES WITH CATEGORY
0116            DO 87 J = 1,NCAT
             C----  INDEX INTO PATTERN CELL TO BEGIN WITH
0117            IRO = ISUM(I,21,0)
             C----  INDEX INTO CATEGORY CELL TO START WITH
0118            IR = ISUM(J,21,0)
0119            IL = ISUM(J,NCAT8,0)
             C----  CHECKING FOR MATCH
0120            DO 84 JJ = 1,NCAT8
0121            IL = IL+1
0122            IF ( 1 - ICAT(K,IL)) 84,85,84
0123         84 CONTINUE
0124            GO TO 87
             C----  IF MATCH--ADD PATTERN DURATIONS FOR EACH OF THE BEHAVIOR ROWS
             C----    INTO THE CATEGORY ROWS
0125         85 DO 86 JJ = 1,21
0126            IRO = IRO + 1
0127            IR = IR + 1
0128         86 IMATN(IR) = IMATN(IR) + INOUT(K,IRO)
0129         87 CONTINUE
             C----  FORCE CATEGORIES INTO THE OLD PATTERN MATRIX
0130            DO 88 I = 1,105
0131         88 INOUT(K,I) = IMATN(I)
             C----  CONVERT TO CATEGORY NAMES FOR MOTHER OR INFANT
0132            DO 89 I = 1,20
0133         89 ONAME(I) = CNAME(K,I)
             C----  I2 = 5 FOR CATEGORY ANALYSIS
0134            I2 = 5
0135            GO TO 90
             C----  SUMMARY SECTION JJJJJJ
             C----  HERE ONLY DOING FOR TOTAL VOCAL (IGNORING OBJECT ROW)
             C----  KDUM ARRAY SAME PRINCIPLE AS JDUM BUT FOR VOCAL
0136         91 III = ISUM(3,7,0)
0137            KDUM(1) = INOUT(K,III+1) + INOUT(K,III+4)
0138            KDUM(2) = INOUT(K,III+1)
0139            KDUM(3) = INOUT(K,III+4)
0140            KDUM(4) =  INOUT(K,III+2) + INOUT(K,III+5)
0141            KDUM(5) = INOUT(K,III+2)
0142            KDUM(6) = INOUT(K,III+5)
0143            WRITE(LINES,101) DYAD, (ACTOR(JJ),JJ=15,151)
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0144      101 FORMAT('1  DYAD NO. ',2A4/ 3X,2A4//'   SUMMARY FOR STATE X PROXIMI
              1TY MATRIX'//44X'MOTHER-PRES'17X'MOTHER OUT'/40X,10('-'),12X,10('-'
              2))
0145          WRITE(LINES,102)
0146      102 FORMAT( 25X'TOTAL'4X'M-PRES'5X'QUIET'4X'ACTIVE'5X'M-OUT'5X'QUIET'
              14X'ACTIVE'/1X87('-'))
0147          WRITE(LINES,105)DUR(7),(JOUM(JJ),JJ=1,6)
0148      105 FORMAT(' DURATION' 11X,       7(I8,2X))
0149          DO 106 JJ = 1,6
0150      106 XOUM(JJ) = JOUM(JJ) / DUR * 100.
0151          WRITE(LINES,107) (XOUM(JJ),JJ=1,6)
0152      107 FORMAT(' PROP OF TOTAL'16X,6(F8.1,2X))
0153          JJ = 0
0154          DO 110 JJJ = 1,4,3
0155          XO = JOUM(JJJ)
0156          DO 110 JJJJ = 1,3
0157          JJ = JJ + 1
0158      110 XOUM(JJ) = JOUM(JJ) / XO * 100.
0159          WRITE(LINES,111) (XOUM(JJ),JJ=1,6)
0160      111 FORMAT(   ' PROP OF M-(IN/OUT)'11X,6(F8.1,2X))
0161          WRITE(LINES,112) (KOUM(JJ),JJ=1,6)
0162      112 FORMAT( 'OVOCAL DUR.'19X,6(I8,2X))
0163          JJ = 0
0164          DO 114 JJJ = 1,4,3
0165          XO = KOUM(JJJ)
0166          DO 114 JJJJ = 1,3
0167          JJ = JJ + 1
0168      114 XOUM(JJ) = KOUM(JJ) / XO * 100.
0169          WRITE(LINES,116)(XOUM(JJ),JJ=1,6)
0170      116 FORMAT(' PROP OF M-(IN/OUT)'11X,6(F8.1,2X))
0171          WRITE(LINES,120)
0172      120 FORMAT(1X,87('-'))
0173       90 CONTINUE
          C----  DO FOR INFANT
0174      100 CONTINUE
0175          RETURN
0176          END

          OPTIONS =/ON,/CK,/OP:2

          BLOCK        LENGTH
          ###A      2490    (011564)#
          .$$$$.    8494    (041134)

          **COMPILER ----- CORE**
             PHASE       USED  FREE
          DECLARATIVES  01145 13155
          EXECUTABLES   01503 12797
          ASSEMBLY      02260 16680
```

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 24   3   1
VOCAL (VOC)       VISUAL (VIS)      VIS-SMILE(SMI)  VIS-VOC           NONE
VIS-VOC-SMILE     VIS-VOC-TPLAY     VIS-SMILE-TPLAY VIS-VOC-SMI-TPL   VIS-TPLAY(TPL)
VOCAL (VOC)       VISUAL (VIS)      VIS-SMILE       VIS-VOC           VOC-VIS-SMILE
TYPE              VOC-SMILE         SMILE           CRY               CRY-VIS
     VOCAL             VISUAL            SMILE             TPLAY             NONE
     VOCAL             VISUAL            SMILE             CRY               NONE
     DK2:A01002.EDT
     DK2:A02001.EDT
     DK2:A03001.EDT
     DK2:A04001.EDT
     DK2:A05002.EDT
     DK2:A06001.EDT
     DK2:A07002.EDT
     DK2:A08002.EDT
     DK2:A09002.EDT
     DK2:A10001.EDT
     DK2:A11001.EDT
     DK2:A12002.EDT
     DK2:B01002.EDT
     DK2:B02001.EDT
     DK2:B03001.EDT
     DK2:B04002.EDT
     DK2:B05001.EDT
     DK2:B06002.EDT
     DK2:B07002.EDT
     DK2:B08002.EDT
     DK2:B09001.EDT
     DK2:B10001.EDT
     DK2:B11001.EDT
     DK2:B12001.EDT
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FORTRAN V06.13                    14:10:15    28-JUN-74    PAGE    1

0001            SUBROUTINE WR1(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,
               1OUG2)
C----           SUBROUTINE WR1 PRINTS THE MATRIX OF BEHAVIOR X SETTING, STATE,
C----             AND PROXIMITY FOR FREQUENCIES OF ONSETS, DURATIONS, AND
C----             CALCULATES AND PRINTS PROPORTIONS, AVERAGE DURATIONS, ETC.
C----             FOR MOTHER AND INFANT; IN BOTH BEHAVIOR PATTERN AND CATEGORY
C----             FORM
0002            COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
               1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
               2 DNAME(64),NFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
               3 ,JFREQ(2,20),IMIAC(2016),LMIAC(2016),LAST(12)
0003            DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),OUT(4),TOT(4),CT(2),
               1 OBJ(9),MVOC(2,6),NUM(2),IMATN(1000),NFREG(1000),XDUR(16)
0004            DIMENSION JDUM(5), KDUM(5)
C----           SET UP TEMPORARY ARRAYS TO HOLD CATEGORIES FOR MOTHER AND INFANT
C----             DURATIONS
0005            EQUIVALENCE (IMATN(1),IMAT(1,1)),(IFREQ(1,1),NFREQ(1))
0006            ISUM(I8,J8,K8) = (I8-1) * J8 + K8
C----           FOR INDEX INTO BEHAVIOR PATTERN (3 ROWS FOR EACH BEH, 16 COL/ROW)
0007            N48 = ICOL * N16
C----           INDEX INTO BEHAVIOR CATEGORIES
0008            IL = NCAT * N48
C----           TOTAL DURATION
0009            DUR = KDUR(15)
C----           TIME IN = TOT. - M-OUT
0010            JDUM(1) = KDUR(15) - KDUR(11)
C----           FEED
0011            JDUM(2) = KDUR(2)
C----           NO FEED =  TOT. M-IN - FEED
0012            JDUM(3) = JDUM(1) - JDUM(2)
C----           CARETAKING = PSLP + FEED + BATH
0013            JDUM(4) = KDUR(1) + KDUR(2) + KDUR(3)
C----           NO CARE IN = NO CARE - M-OUT
0014            JDUM(5) = KDUR(4) - KDUR(11)
C----           DO FOR MOTHER AND INFANT
0015            DO 500 M = 1,2
C----           IA = 10 FOR PATTERN ANALYSIS
0016            IA = 10
C----           0 OUT ARRAY FOR CATEGORY DURATION SUMS
0017            DO 240 JJ = 1,IL
0018          240 IMATN(JJ) = 0
C----           FILL IN WITH PATTERN NAMES FOR  MOTHER OR INFANT
0019            DO 300 JJ = 1,40
0020          300 DNAME(JJ) = PNAME(M,JJ)
C----           INDEX INTO ACTOR ARRAY
0021            IS = ISUM(M,2,1)
0022            IS1 = IS + 1
C----           DO FOR PATTERNS THEN FOR CATEGORIES
0023            DO 500 J = 1,2
C----           INDEX INTO TYPE ARRAY (PATTERN OR CATEGORY)
0024            IT = ISUM(J,2,1)
0025            IT1 = IT + 1
C----           L ANALYSES PERFORMED BY FORMATS 307, 309, 311, 313, & 2 IN ORDER
0026            DO 373 L = 1,5
0027            IPAGE = IPAGE + 1
```

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FORTRAN V06.13                    14:10:15    28-JUN-74    PAGE    2

      C----  WRITE INITIAL HEADING
0028        WRITE(LINES,305) IPAGE, (DYAD(JJ),JJ=1,2),(ACTOR(JJ),JJ=IS,IS1),
           1 (TYPE(JJ),JJ=IT,IT1)
0029    305 FORMAT ('1  PAGE',I4,'  DYAD NO. ',2A4/ 3X,2A4,':',' '2A4,/ )
      C----  WRITE ANALYSIS HEADING
0030        GO TO (306,308,310,312,1), L
0031    306 WRITE(LINES,307)
0032    307 FORMAT('   FREQUENCIES')
0033        GO TO 314
0034    308 WRITE(LINES,309)
0035    309 FORMAT ('   DURATION')
0036        GO TO 314
0037    310 WRITE(LINES,311)
0038    311 FORMAT('   AVERAGE DURATION')
0039        GO TO 314
0040    312 WRITE(LINES,313)
0041    313 FORMAT('   PROPORTION OF TOTAL ROW DURATION')
      C----  SET TOTAL DURATION OF SESSION
0042        ITOT = KDUR(KKCOL)
0043        GO TO 314
0044      1 WRITE(LINES,2)
0045      2 FORMAT('   PROPORTION OF TOTAL COLUMN DURATION')
      C----  COMPLETE HEADING
0046    314 WRITE(LINES,315)
0047    315 FORMAT (6X,'ANALYSIS BY SETTING, STATE, AND PROXIMITY'//37X,'SETTI
           1NG'30X,'STATE',26X,'PROXIMITY'/27X,30('-'),5X,30('-'),5X,30('-'))
0048        WRITE(LINES,217)
0049    217 FORMAT(6X,'BEHAVIOR',7X,'TOT',5X,'PSLP',2X,'FEED',2X,'BATH',2X,
           1'LOCA',5X,'TOT'5X,'ASLP',2X,'DRSY',3X,'OUT',5X,'ACT',3X,'TOT',6X,
           2'OUT',4X,'IN',2X,'NEAR',2X,'HOLD',5X,'TOT'/1X,122('-'))
      C----  1ST ROW APPLIES TO  SETTING, STATE, AND PROX. (IGNORES BEHV.)
0050    415 GO TO (420,430,440,450,450), L
      C----  FREQUENCY TOTALS
0051    420 WRITE(LINES,421) (KFREQ(JJ),JJ=1,IKCOL)
0052    421 FORMAT(' TOTAL',11X,'-',6X,3(' - ',5I6))
0053        GO TO 516
      C----  DURATION TOTALS
0054    430 WRITE(LINES,422) KDUR(KKCOL),(KDUR(JJ),JJ=1,IKCOL)
0055    422 FORMAT(' TOTAL'11X,'-',I6,3(' - ',5I6))
0056        GO TO 516
      C----  AVERAGE DURATION
0057    440 DO 445 JJ = 1,IKCOL
0058        XD = KDUR(JJ)
0059    445 XDUM(JJ) = XD / KFREQ(JJ)
0060        WRITE(LINES,446) (XDUM(JJ),JJ=1,IKCOL)
0061    446 FORMAT(' TOTAL',11X,'-',6X,3(' - ',5F6.1))
0062        GO TO 516
      C----  PROPORTION OF TOTAL TIME
0063    450 DO 455 JJ = 1,IKCOL
0064        XD = KDUR(JJ)
0065    455 XDUM(JJ) = XD / ITOT * 100.
0066        WRITE(LINES,446) (XDUM(JJ),JJ=1,IKCOL)
      C----  DO FOR EACH BEHAVIOR (IA=10), THEN FOR EACH CATEGORY (IA=5)
      C----       THERE ARE 3 ROWS ASSOCIATED W/ EACH IA
0067    516 DO 570 IDEH = 1,IA
      C----  INDEX INTO WHICH NAME OF DNAME IS TO BE PRINTED
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FORTRAN V06.13                    14:10:15    26-JUN-74    PAGE     5

0066            I0 = ISUM(IBEH,4,1)
0068            I01 = I0 + 3
      C----     PRINT NAME AND LINE
0070            WRITE (LINES,317) (ONAME(JJ),JJ=I0,I01)
0071          317 FORMAT(16X,107('-') / 1X,4A4)
      C----     JB = INDEX INTO WHICH BEHAVIOR OR CAT.
0072            JB = ISUM(IBEH,N48,0)
      C----     KL = WHICH CELL TO START WITH
0073            KL = JB + 1
      C----     DO FOR OBJECT, NO OBJECT, AND IGNORING OBJECT
0074            DO 370 IRO = 1,ICOL
      C----     INDEX INTO WHICH OBJECT CATEGORY
0075            IO = ISUM(IRO,ICOL,1)
0076            I01 = IO + 2
      C----     END OF GIVEN BEHAVIOR X OBJECT ROW     KM
0077            KM = KL + (N16 - 1)
      C----     GO TO PROPER ANALYSIS
0078            GO TO (340,350,330,320,3), L
      C----     GET 1ST COLUMN AND DIVIDE BY TOTAL DURATION (*100 FOR PERCENT)
0079          3 JB = JB + 1
0080            XDUM(1) = IDUR(M,JB)
      C----     DIVIDE REST OF ELEMENTS IN ROW BY TOTAL DURATION OF THAT COLUMN
0081            XDUM(1) = XDUM(1) / RDUR(KKCOL) * 100.
0082            DO 4 NCOL = 2,N16
0083            DIVIS =  RDUR(NCOL-1)
0084            JB = JB + 1
0085          4 XDUM(NCOL) = IDUR(M,JB) / DIVIS * 100.
0086            WRITE(LINES,326) (OBJ(JJ),JJ=I0,I01),(XDUM(JJ),JJ=1,N16)
0087            GO TO 370
      C----     GET TOTAL ROW DURATION (1ST COL  IN ROW )
0088        320 JB = JB + 1
0089            DIVIS = IDUR(M,JB)
0090            XDUM(1) = DIVIS/ITOT * 100.
      C----     DIVIDE REST OF ROW BY TOTAL ROW DURATION
0091            DO 325 NCOL = 2,N16
0092            JB = JB + 1
0093        325 XDUM(NCOL) = IDUR(M,JB)/DIVIS * 100.
0094            WRITE(LINES,326)(OBJ(JJ),JJ=I0,I01),(XDUM(JJ),JJ=1,N16)
0095        326 FORMAT(6X,3A4,F6.1,31(' - ',5F6.1))
0096            GO TO 370
      C----     DIVIDE EACH DURATION ELEMENT BY CORRESPONDING FREQUENCY ELEMENT
0097        330 DO 335 NCOL = 1,N16
0098            JB = JB + 1
0099            XD = IFREQ(M,JB)
0100        335 XDUM(NCOL) = IDUR(M,JB) / XD
0101            WRITE (LINES,326)(OBJ(JJ),JJ=I0,I01),(XDUM(JJ),JJ=1,N16)
0102            GO TO 370
      C----       PRINT OUT FREQUENCY ROW AND GO TO 360 TO RESET KL TO 1ST COL
      C----       OF NEXT ROW
0103        340 WRITE(LINES,341)(OBJ(JJ),JJ=I0,I01),(IFREQ(M,JJ),JJ=KL,KM)
0104        341 FORMAT(6X,3A4,16,31(' - ',5I6))
0105            GO TO 360
      C----     PRINT OUT DURATION ROW AND GO TO 360 TO RESET KL TO 1ST COLUMN
      C----       OF NEXT ROW
0106        350 WRITE(LINES,341)(OBJ(JJ),JJ=I0,I01),(IDUR(M,JJ),JJ=KL,KM)
0107        360 KL=KM+1
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FORTRAN V06.13                    14:10:15    28-JUN-74    PAGE    4

0108        370 CONTINUE
            C----  END EACH MATRIX WITH LINE
0109        373 WRITE(LINES,371)
0110        371 FORMAT(1X,122('-'))
            C----  SEE IF OK PATTERN OR CATEGORY- IF CAT, GO TO SUMMARY SECTION
0111           GO TO (380,499), J
            C----  IF FINISHED PATTERN - CONVERT TO USE FOR CATEGORIES
            C----  IA NOW = 5, (5 CATEGORIES)
0112        380 IA = 5
            C----  CHANGE TO CATEGORY NAMES FOR MOTHER OR INFANT
0113           DO 385 JK = 1,20
0114        385 DNAME(JK) = CNAME(M,JK)
            C----  SEARCH FOR PRESENCE OF CAT. IN EACH BEHAVIOR PATTERN
0115           DO 405 L = 1,10
0116           DO 405 IBEH = 1,NCAT
0117           JK = ISUM(IBEH,NCATS,0)
0118           DO 390 KK = 1,NCATS
0119           JK = JK + 1
0120           IF (L - ICAT(M,JK)) 390,395,390
0121        390 CONTINUE
0122           GO TO 405
            C----  IF PRESENT-GET INDEX INTO PATTERN MATRIX (JL) AND INTO CAT.
            C----     ARRAY(JK)
0123        395 JK = ISUM(IBEH,N48,0)
0124           JL = ISUM(L,N48,0)
            C----  ADD DURATION OF PATTERN INTO CATEGORY ARRAY FOR EACH OF 3 ROWS
            C----     OF OBJECTS FOR THAT BEHAVIOR (16 COL./ROW)
0125           DO 400 IKC = 1,N48
0126           JK = JK + 1
0127           JL = JL + 1
0128        400 IMATN(JK) = IMATN(JK) + IDUR(M,JL)
0129        405 CONTINUE
            C----  PUT CAT. FREQ. AND DURATIONS INTO ORIGINAL PATTERN MATRIX
            C----  START PROCESS AGAIN, USING CATEGORIES
0130           DO 410 JL = 1,IL
            C----  SUMMARY SECTION JJJJJJJJ
            C----  SAME PROCESS AS KDUR IN BEGINNING OF SUBROUTINE BUT USING TOTAL
            C----     VOCAL (3RD ROW)
0131           IDUR(M,JL) = IMATN(JL)
0132        410 IFREQ(M,JL) = JFREQ(M,JL)
0133           GO TO 500
0134        499 III = ISUM(3,N16,0)
0135           KDUM(1) = IDUR(M,III+16) - IDUR(M,III+12)
0136           KDUM(2) = IDUR(M,III+3)
0137           KDUM(3) = KDUM(1) - KDUM(2)
0138           KDUM(4) = IDUR(M,III+2) + IDUR(M,III+3) + IDUR(M,III+4)
0139           KDUM(5) = IDUR(M,III+5) - IDUR(M,III+12)
0140           WRITE(LINES,15) DYAD, (ACTOR(JJ),JJ=IS,IS1)
0141        15 FORMAT('1  DYAD NO. ', 2A4/3X,2A4//5X'SUMMARY DESCRIPTION')
0142           WRITE(LINES,16)
0143        16 FORMAT(//50X'MOTHER PRESENT'/40X,38('-')/ 21X'TOTAL',5X'M-PRES'
              16X'FEED'4X'NO FEED'3X'CARE'6X'NO CARE'/ 1X77('-'))
0144           WRITE(LINES,17) KDUR(15),(JDUM(JJ),JJ=1,5)
0145        17 FORMAT(' DURATION' 9X,6(I8,2X))
            C----  PROPORTION OF TOTAL TIME
0146           DO 18 JJ = 1,5
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FORTRAN V06.13                    14:10:15    28-JUN-74    PAGE    5

0147        18 XDUM(JJ) = JDUM(JJ) / DUR * 100.
0148           WRITE(LINES,19)(XDUM(JJ),JJ=1,5)
0149        19 FORMAT(' PROP OF TOTAL '14X,5(F8.1,2X))
0150           XD = JDUM(1)
            C----  PROPORTION OF M-IN
0151           DO 20 JJ = 1,5
0152        20 XDUM(JJ) = JDUM(JJ) / XD * 100.
0153           WRITE(LINES,21)(XDUM(JJ),JJ=1,5)
0154        21 FORMAT(' PROP OF M-PRES'13X,5(F8.1,2X))
            C----  VOCAL DUR. M-PRES
0155           WRITE(LINES,22) (KDUM(JJ),JJ = 1,5)
0156        22 FORMAT('0VOCAL DUR.(M-PRES)'9X,5(I8,2X))
0157           XD = KDUM(1)
            C----   PROP. VOCAL DURATION -M-PRESENT
0158           DO 23 JJ = 1,5
0159        23 XDUM(JJ) = KDUM(JJ) / XD * 100.
0160           WRITE(LINES,24) (XDUM(JJ),JJ=1,5)
0161        24 FORMAT(' PROP OF M-PRES'13X,5(F8.1,2X))
0162           WRITE(LINES,25)
0163        25 FORMAT(1X,77('-'))
0164       500 CONTINUE
0165           RETURN
0166            END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK        LENGTH
        WRK1      2600    (012120)*
        .$$$$.    8074    (037424)

        **COMPILER ----- CORE**
           PHASE        USED  FREE
        DECLARATIVES  00622 13678
        EXECUTABLES   01553 12747
        ASSEMBLY      02208 16652
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FORTRAN V06.13                    10:39:58     26-JUN-74    PAGE     1

0001          SUBROUTINE FILL(NOW,NLAST,IHALT,IFLOW,NHALT,ICL,NSTEP,IHOLD)
              C----  SUBROUTINE FILL FILLS IN IMAT MATRIX FROM LAST BEHAVIOR CHANGE
              C----    (OR IF M-OUT) UNTIL NOW--EACH ROW REPRESENTS 1 SEC.
              C----      IF M-OUT--10 IS ADDED TO BEH. CODE TO DISCRIMINATE PROXIMITY
              C----      LATER IN SUBROUTINE IAC
              C----  CHECKS FOR OVERFLOW OF MATRIX BOUND (500):
              C----      IFLOW> 1 IF BEHAVIOR OVERFLOW
              C----      NHALT>1 IF PLACEMENT OF NSTEP 0'S AFTER  A HALT IN THE
              C----        OBSERVATIONAL RECORD
              C----      IF IFLOW +/OR NHALT >0  WILL SEND MAINLINE TO  CALCULATION
              C----      SUBROUTINES AND THEN TO REFILL
0002          COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION IHOLD(7)
              C----  GET LENGTH OF TIME FROM LAST FILL
0004          IX = NOW - NLAST
              C----  CHECK IF FILLING MATRIX FROM ICL (LAST ROW ENTERED) TO IX + ICL
              C----    WOULD OVERFLOW 500 LIMIT
0005          IFLOW = ICL + IX - 500
0006          IF (IFLOW) 17,17,15
              C----  IF IT DOES--FILL ONLY UP TO 500 AND KEEP RECORD OF IFLOW
0007       15 IX = IX - IFLOW
              C----  DO FOR MOTHER AND INFANT
0008       17 DO 20 J = 1,2
              C----  SET TO BEHAVIOR (OR BEH. + 10 IF M-OUT)
0009          IDUM = IHOLD(J+5)
0010          IF(IHOLD(5) .EQ. 0) IDUM = IDUM + 10
0011          IA = ICL
0012          DO 20 K = 1,IX
              C----  1 TO # SECONDS BEHAVIOR LASTED (UNLESS OVERFLOW) -- MOVE UP IN
              C----    MATRIX
0013          IA = IA + 1
0014       20 IMAT(J,IA) = IDUM
              C----  ICL = LAST ROW FILLED
0015          ICL = IA
              C----  IF NO HALT, RETURN
0016          IF (IHALT) 40,40,25
              C----  IF A HALT, CHECK FOR OVERFLOW IN ADDING NSTEP 0'S
0017       25 NHALT = IFLOW + NSTEP
              C----    IF BEHAVIOR OR NHALT OVERFLOW, WAIT UNTIL REFILL TO SET IN BREAK
0018          IF (IFLOW) 30,30,40
0019       30 IF (NHALT) 35,35,40
              C----    IF IT WON'T OVERFLOW, SET ICL TO SKIP NSTEP ROWS BEFORE NEXT
              C----      FILL
0020       35 ICL = ICL + NSTEP
0021       40 RETURN
0022          END

              OPTIONS =/ON,/CK,/OP:2

              BLOCK        LENGTH
              FILL      201     (000622)*
              **TOTAL*  8074    (037424)
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**COMPILER ----- CORE**
   PHASE        USED  FREE
DECLARATIVES  00622 13678
EXECUTABLES   01131 13169
ASSEMBLY      01164 17776
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FORTRAN V06.13                    11:14:30    28-JUN-74    PAGE     1

0001          SUBROUTINE MATS(N,NSTEP,IDUR)
              C----  SUBROUTINE MATS  CREATES 3 TRANSITION MATRICES:
              C----         ITRAN = FREQ. OF TRANSITIONS
              C----         LTRAN = FREQ. OF ENTERING AT N TO N+1 CELL
              C----         JTRAN = FREQ. OF REMAINING IN  A CELL AFTER ENTERING FROM
              C----                 N
0002          COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),INIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION IJ(2)
              C----  I3 AND I4, SET IN UNUSED PORTION OF IFREQ,  ARE USED TO MAINTAIN
              C----    CONTINUITY BETWEEN IMAT CHANGES
0004          I3 = IFREQ(1,500)
0005          I4 = IFREQ(2,500)
              C----  MOVE BACK 1 STEP TO KEEP CONTINUITY AT STATEMENT 10
0006        4 N = N - NSTEP
0007        5 J = 0
              C----  BREAK TRANSITION MATRICES IF MOTHER WAS OUT OF ROOM (CODE>10)
0008          IF (IMAT(1,N) .GT. 10) IDUR = 0
0009          IF (IDUR) 3,3,6
0010        3 I3 = 0
0011          I4 = 0
0012        6 J = J + 1
0013       10 N = N + NSTEP
              C----  IF WILL EXCEED 500 (ROUND FOR IMAT) THEN STOP
0014          IF (N - 500) 15,15,80
              C----  IF IMAT = 0 THEN A BREAK OCCURRED, GO TO 50 TO RESTART
0015       15 IF (IMAT(1,N)) 50,50,20
              C----  IF > 10 -MOTHER OUT- SO TRY NEXT STEP -- GO TO 5
0016       20 IF (IMAT(1,N) - 10) 21,21,5
              C----  CREATE DICHOTOMY FOR M IM1 = 1-VOCAL, =2-NO VOCAL
0017       21 IM1 = 2
0018          MATN = IMAT(1,N)
0019          GO TO (25,30,30,25,30,25,25,30,25,30), MATN
0020       25 IM1 = 1
              C----  CREATE DICHOTOMY FOR INFANT, IM2 = 1-VOCAL, = 2-NOVOCAL
0021       30 IM2 = 2
0022          MATN = IMAT(2,N)
0023          GO TO (35,40,40,35,35,40,35,40,40,40), MATN
0024       35 IM2 = 1
0025          GO TO 40
              C----  CONVERT M AND I RESPONSE TO 1 # AND PLACE IN STEP N(J=1) OR
              C----       N+1(J=2)
0026       40 IJ(J) = (IM1-1) * 2 + IM2
              C----  IF 1ST STEP-COLLECT 2ND STEP;  IF 2ND CONTINUE
0027          GO TO (6,45), J
              C----  CONVERT N-N+1 TO 1 NUMBER TO CHECK FOR NEW CELL ENTRY (LTRAN)  IT
0028       45 I1 = IJ(1)
0029          I2 = IJ(2)
0030          IT = (I1-1) *2 + I2
              C----  USED FOR JTRAN (FREQ. OF REMAINING)
0031          IF (I4 .NE. I2) I3 = I1
0032          I4 = I2
              C----  COLLECT MATRICES
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FORTRAN V06.13                    11:14:30    28-JUN-74    PAGE    2

0033        47 JTRAN(I3,I4) = JTRAN(I3,I4) + 1
          C----  CHECK PREVIOUS CELL ENTRY (IDUM) W/ PRESENT ONE (IT)
0034           IF (IDUM - IT) 48,49,48
0035        48 LTRAN(I1,I2) = LTRAN(I1,I2) + 1
0036           IDUM = IT
0037        49 ITRAN(I1,I2) = ITRAN(I1,I2) + 1
          C---- SAVE N+1(IJ(I)) AS N(IJ(1)) AND GET NEW N+1
0038           IJ(1) = IJ(2)
0039           J = 1
0040           GO TO 5
          C----  HALT IN RECORD CYCLE UNTIL A CODE >0,OR STOP IF WOULD BE > 500
0041        50 IDUM = 0
0042           DO 60 I = 1,NSTEP
0043           N = N + 1
0044           IF (N - 500) 55,55,80
0045        55 IF (IMAT(1,N)) 60,60,4
0046        60 CONTINUE
          C---- AFTER REACHING 500, RESET N TO START ON 21ST RECORD (1-21 ARE
          C----      REPEATS, SEE REFILL.
0047        80 N = 22 - NSTEP
0048        30 IFREQ(1,500) = I3
0049           IFREQ(2,500) = I4
0050           RETURN
0051           END

          OPTIONS =/ON,/CK,/OP:2

          BLOCK        LENGTH
          MATS    460     (001630)*
          ****.   8074    (037424)

          **COMPILER ----- CORE**
             PHASE       USED  FREE
          DECLARATIVES 00622 13678
          EXECUTABLES  01131 13169
          ASSEMBLY     01304 17636
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FORTRAN V06.13                    11:19:11    26-JUN-74    PAGE    1

0001            SUBROUTINE IAC(NUM,ICAT)
          C---- SUBROUTINE IAC   DETERMINES THEN ONSET OF VOCAL OR CRY PATTERNS
          C----    AND CATEGORIES FOR MOTHER AND INFANT AND:
          C----         1.  SEARCHES THE PRECEEDING 10 SEC.'S FOR VALID BEHAVIOR
          C----               PATTERN  OF OTHER PAIR MEMBER AS ANTECEDENT
          C----         2.  SEARCHES THE FOLLOWING 10 SEC.'S FOR A VALID PATTERN
          C----               AS CONSEQUENT
          C----         3.  SETS UP ANTECEDENT/CONSEQUENT FREQUENCY MATRIX AND
          C----               A MATRIX OF LATENCIES OF CONSEQUENTS FOR A/C
          C----         4.  LISTS EACH ONSET ON A FILE , BY A/C PATTERN AND BY A
          C----               CHART CONVERSION INTO CATEGORIES.
          C----  BOTH ARRAYS IMIAC(FREW) AND LMIAC) CONTAIN 14 12 X 12 MATRICES
          C----       1-6 (MOTHER)--5 PATTERN ONSETS, 1 CATEGORY ONSET    VOCAL
          C----       7-14 (INFANT)--4 VOCAL PATTERN ONSETS, 2 CRY PATTERN ONSETS,
          C----                        1 VOCAL CATEGORY ONSET, 1 CRY CATEGORY ONSET
0002            COMMON IPAGE,LINES,N16,N48,LCOL,IKCOL,IRCOL,NCAT,NCATG,KPAT(2),
                1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CHAME(2,20),
                2 ONAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
                3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003            DIMENSION ICHART(11), IANT(2), IANTL(2), IML(4),NUM(2),ICAT(2,40)
0004            DIMENSION JROW(2), ICOL(2), IVOC(2,6)
          C----  SET JROW AND ICOL(2) AS TOTALS, SET VOCAL BEHAVIORS, LAST 2 FOR
          C----    INFANT ARE CRIES
0005            DATA JROW(2),ICOL(2),IVOC/12,12,1,1,4,4,6,5,7,7,9,9,0,10/
0006            DATA IX,IB/'X',' '/
0007            NC = 12
0008            NR = 12
0009            NAC = NR * NC
          C----  1ST 10 SEC.'S CONTAIN RESPONSES ALREADY SEARCH FOR ONSETS
          C----  ONLY UP TO 489 BECAUSE A 10-SEC. FORWARD SEARCH COULD NOT BE
          C----  COMPLETED
0010            DO 100 N = 11,489
          C----  IPROX USED TO INDICATE WHETHER MOTHER WAS OUT M-OUT
0011            IPROX = 0
          C----  IF = 0, THERE WAS A BREAK IN THE OBSERVATIONAL RECORD
0012            IF(IMAT(1,N)) 99,99,5
          C----  SET JJ TO INFANT VALUE (2) WHEN WORKING ON MOTHER RECORDS
          C----    (WILL BE SWITCHED TO 1 WHEN WORKING ON INFANT) USED AS INDEX
          C----      INTO M/I PART OF MATRICES
0013          5 JJ = 2
          C----  DO FOR BOTH MOTHER (1) AND INFANT (2)
0014            DO 90 J = 1,2
0015            IF (J .EQ. 2) JJ = 1
0016            IMV = IMAT(J,N)
          C----  IF M-OUT, RECORD WILL BE >10--SET IPROX TO 1, SUBTRACT 10 TO
          C----    GET ACTUAL BEHAVIOR CODE
0017            IF (IMV .GT. 10) IPROX = 1
0018            IF (IMV .GT. 10) IMV = IMV - 10
          C----  CHECK IF BEHAVIOR WAS A VOCAL OR A CRY (FOR INFANT)
0019            DO 10 I = 1,6
0020            IF (IMV - IVOC(J,I)) 10,15,10
0021         10 CONTINUE
          C----  IF NOT VOCAL, THEN RESET VOC. PATTERN(JPAT) AND CATEGORY(KPAT)=0
          C----  IF WORKING ON INFANT ALSO SET CRY TO 0
0022            KPAT(J) = 0
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FORTRAN V06.13                    11:19:11    25-JUN-79    PAGE    4

0025            JPAT(J) = 0
0026            IF (J .EQ. 2) ICRY1 = 0
0027            GO TO 90
C----     IF IT WAS A VOC (OR CRY) SET IPAT = CODE FOR VOCALS (IVOC(I))
0028         15 IPAT = I
C----     IF IT MATCHES PREVIOUS PATTERN W/OUT A BREAK, GO TO 90 TO CHECK
C----     FOR OTHER PERSON
0029            IF (IPAT - JPAT(J)) 20,90,20
C----     IF NO MATCH OR BREAK OCCURED(JPAT(J)=0)  THEN THIS IS AN ONSET
0030         20 JPAT(J) = I
0031            ICRY = 0
C----     IF ON INFANT AND PATTERN CODE > 4, ONSET WAS A CRY
0032            IF (J .EQ. 2 .AND. I .GT. 4) ICRY = 1
C----
C----     START ANTECEDENT CONSEQUENT SEARCH....
C----
C----     SET BREAK = 0
0033            IBRK = 0
0034            K = 4
C----     STEPPING THROUGH MATRIX BY 1'S
0035            ISTEP = 1
C----     SET IANT(1) AND IZ TO GARBAGE SO CAN'T BE USED IN ANTECEDENT RUN
0036            IANT(1) = 15
0037            IZ = 0
C----     DO FOR ANTECEDENT IANT(1) AND CONSEQUENT IANT(2)     L
0038            DO 60 L = 1,2
C----     SET VISUAL ONLY (IVIS) AND NOTHING (I.E., PATTERN = NO BEHAVIOR)
C----     AND 2ND OCCURANCE OF VISUAL AFTER NOTHING(IA) TO 0
0039            IVIS = 0
0040            INONE = 0
0041            IA = 0
C----     DO 10 STEPS
0042            DO 50 I = 1,10
C----     (BACK--ISTEP=1, OR FORWARD--ISTEP=-1)
0043            K = K - ISTEP
C----     FOR PERSON J ONSET, LOOKING FOR 'OTHER'S (JJ'S) BEHAVIORS JJJJJJJ
0044            IBEH = IMAT(JJ,K)
C----     IF 0, THERE'S A BREAK--GO TO 99 TO RESET ONSETS TO 0
0045            IF (IBEH) 99,99,25
C----     IF >10 H-OUT SO SUBTRACT 10 TO OBTAIN BEHAVIOR CODE
0046         25 IF (IBEH .GT. 10) IBEH = IBEH - 10
C----     (WORKS ONLY FOR CONSEQUENTS)-- IF NO BREAK AND BEHAVIOR IS SAME
C----       AS ANTECEDENT, CONTINUE LOOKING FOR A NEW PATTERN
0047            IF (IBRK .EQ. 0 .AND. IBEH .EQ. IANT(1)) GO TO 50
C----     IF BEHAVIOR OTHER THAN  VIS ONLY OR NONE AND FAILED THE TEST
C----       ABOVE--THIS IS A VALID A OR C PATTERN-- SO USE IT AND BREAK OUT
0048            IF (IBEH .NE. 2 .AND. IBEH .NE. JJ+4) GO TO 50
C----     THERE NOW WILL BE A BREAK IF A OR C BEHAVIOR (W/ POSSIBLE
C----       EXCEPTIONS FOR VIS ONLY OR NOTHING--SEE AFTER STATEMENT 50)
C----     IF VISUAL ONLY FIRST FOUND AT THIS STEP , SET IVIS = ABS. STEP #
0049            IF (IBEH .EQ. 2 .AND. IVIS .EQ. 0) IVIS = I
C----     SAME AS ABOVE BUT FOR NONE, USING INONE
0050            IF (IBEH .EQ. JJ+4 .AND. INONE .EQ. 0) INONE = I
C----     IF A 2ND VIS ONLY OCCURS AFTER A NONE-KEEP RECORD OF STEP IN IA
C----        IN CASE VIS ONLY WAS THE ANTECEDENT
0051            IF (IBEH .EQ. 2 .AND. INONE .GT. 0 .AND. IA .EQ. 0) IA = I
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FORTRAN V06.13                    11:19:11    28-JUL-74    PAGE     3

0050            IBRK = 1
                C----  CHECK FOR NEXT STEP
0051         30 CONTINUE
                C----  COMPLETED LOOP W/OUT FINDING VALID A/C--SO NOW WORKING W/ VIS
                C----     ONLY, NONE, OR A BEHAVIOR THAT CONTINUED FROM ANTECEDENT
                C----  SET STEP TO 0
0052            I = 0
                C----  IF NO BREAK WHEN REACHED HERE, THEN ANTECEDENT CONTINUED FOR
                C----  DURATION OF CONSEQUENT SEARCH (ONLY ONE THAT DIDN'T HIT IBRK=1)
                C----    SO GO TO 50 W/ 0 LATENCY (I=0) AND CONSEQUENT=ANTECEDENT)
0053            IF (IBRK) 50,50,35
                C----  IF THERE WAS A BREAK--THEN WENT THRU LOOP W/ VIS,NONE, OR BOTH
0054         35 IBRK = 0
                C----  IF IVIS >0, VISUAL TAKES PRECEDENCE OVER NONE , AND CODE = 2 VIS
                C----  SET A OR C = VIS CODE AND LATENCY = TIME 1ST HIT VISUAL
0055            IF (IVIS) 45,45,40
0056         40 IBEH = 2
0057            I = IVIS
                C----  (FOR CONSEQUENT ONLY)  IF VISUAL WAS LAST CODE ENTERED BEFORE
                C----    ONSET (IZ=2), EVEN IF NOT LISTED AS ANTECEDENT, AND A NONE
                C----  BROKE UP THE VISUAL CONSEQUENT STREAM, THEN USE 2ND VISUAL ONSET
                C----    IA AS LATENCY
0058            IF (IA .GT. 0 .AND. IZ .EQ. 2) I = IA
                C----  IF VISUAL BEFORE OR AFTER > 1 THEN THERE WAS A BREAK, RESET IBRK
0059            IF (IVIS .GT. 1) IBRK = 1
                C----  USE INFORMATION JUST COLLECTED AS A OR C
0060            GO TO 50
                C---- IF NO VISUAL W/OUT BREAK FROM ANTECEDENT, OR NO VIS AT ALL THEN
                C----  USE NONE
0061         45 I = INONE
                C----  SET ANT/CONSEQ (L) = BEHAVIOR PATTERN FOUND  AND SET LATENCY = I
0062         50 IANT(L) = IBEH
                C----  SET LATENCY OF A OR C = ABSOLUTE STEP VALUE I
0063            IANTL(L) = I
                C----  RESET K TO ORIGINAL TIME
0064            K = N
                C----  SET ISTEP = -1 TO MOVE FORWARD IN MATRIX (K=K-(-ISTEP))
0065            ISTEP = -1
                C----  IF ON ANTECEDENT (L=1) AND IF THERE WAS A VIS OR NONE BREAK
                C----    GETTING A VALID PATTERN--SET IZ=BEHAV.JUST PRECEEDING ONSET
0066            IF (L .EQ. 1 .AND. IBRK .EQ. 1) IZ = IMAT(JJ,N-1)
                C----  IF  IZ > 10, M-OUT SO SUBTRACT 10 TO GET CORRECT CODE
0067            IF (IZ .GT. 10) IZ = IZ - 10
0068         60 CONTINUE
                C----  END OF A C SEARCH FOR THAT ONSET
                C----  MM IS INDEX INTO M OR I LEVEL OF THE ARRAY (1ST 6 "MATRICES"
0069            MM = IPAI
                C----    FOR MOTHER-- IF ON INFANT GET TO 2ND LEVEL
0070            IF (J .EQ. 2) MM = MM + 6
                C----  SET UP FOR CONTINUE COLUMN IF CONSEQUENT = ANTECEDENT (0 LATENCY)
0071            IF (IANTL(2) .EQ. 0) IANT(2) = 0
                C----  IMI GETS ACCESS INTO PROPER M OR I X PATTERN ONSET "MATRIX"
0072            IMI = (MM - 1) * NAC
                C----  ADD 1 TO ROW AND COL. TO ALLOW FOR CONTINUE COL. AND M-OUT ROW
0073            JROW(1) = IANT(1) + 1
0074            ICOL(1) = IANT(2) + 1
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F...  V06.15          11:19:11    28-JUN-74    PAGE    4

0077          IL = 0
              C----  L=1 FOR PARTICULAR A/C CELL, 2 FOR TOTALS
0078          DO 64 L = 1,2
              C----  MACR  ACCESS TO ROW
0079          MACR = (IROW(L) - 1) * NC
              C----  64 LOOP--ROW X COL CELL, ROW X COL TOT, ROW TOT X COL, ROW TOT X
              C----    COL TOT
0080          DO 64 LL = 1,2
0081          IL = IL + 1
              C----  IML ACCESS TO COLUMN
0082          IML(IL) = MACR + ICOL(LL)
              C----  WHICH CELL
0084          LIM = IMI + IML(IL)
              C----  ADD INTO FREQUENCY "MATRIX"
0032          IMIAC(LIM) = IMIAC(LIM) + 1
              C----  ADD LATENCY OF CONSEQUENT INTO LATENCY "MATRIX"
0085       64 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
              C----  IF M-OUT-- ADD INTO M-OUT ROW
0084          IF (IPROX) 66,66,62
0085       62 DO 63 LL = 1,2
              C---- USE JUST COLUMN, WILL ALWAYS BE 1ST ROW OF "MATRIX"
0086          LIM = ICOL(LL) + IMI
0087          IMIAC(LIM) = IMIAC(LIM) + 1
0086       63 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
              C----  CHECK IF ONSET WAS ALSO A CATEGORY ONSET (VOC FOR M & I, + CRY-I
0089       66 GO TO (120,121), J
              C----  IF CATEGORY WAS ALREADY PRESENT--IGNORE, IF NOT SET CAT ONSET =1
              C----    AND FILL IN "MATRIX"
0090      121 IF (ICRY) 120,120,128
0091      120 IF (KPAT(J)) 65,65,78
0092       65 KPAT(J) = 1
0093          GO TO 68
              C----  IF PREVIOUS BEHAVIOR WAS NOT A CRY, THEN SET TO CRY ONSET
0094      128 IF (ICRY1) 125,125,78
0095      125 ICRY1 = 1
              C----  MM=6-LEVEL OF ARRAY FOR VOCAL CAT ONSET FOR MOTHER
0096       68 MM = 6
              C----  IF INFANT, 13 = LEVEL FOR VOC ONSET, IF WAS CRY ICRY = 1 SO GET
              C----    TO 14TH MATRIX
0097          IF (J .EQ. 2) MM = 13 + ICRY
              C----  IMI = ACCESS TO PROPER "MATRIX"
0098          IMI = (MM - 1) * NAC
0099          DO 75 LL = 1,4
              C----  USE ROW AND COL. CALCULATIONS FROM LOOP 64
0100          LIM = IML(LL) + IMI
0101          IMIAC(LIM) = IMIAC(LIM) + 1
0102       75 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
0103          IF (IPROX) 78,78,76
              C----  SAME AS DO 63 LOOP
0104       76 DO 77 LL = 1,2
0105          LIM = ICOL(LL) + IMI
0106          IMIAC(LIM) = IMIAC(LIM) + 1
0107       77 LMIAC(LIM) = LMIAC(LIM) + IANTL(2)
              C----
              C----  SET UP ANALYSIS BY CATEGORY CHART
              C---- BLANK OUT CHART
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FORTRAN V06.13                    11:19:11    26-JUL-74    PAGE     5

0137          74 DO 889 LL = 1,11
0138         889 ICHART(LL) = IB
0139              DO 82 LL = 1,2
              C---- IF CONSEQUENT WAS A CONTINUATION SET CONT. COL. ICHART(6) = "X"
0140              IF (IANT(LL) .EQ. 0) GO TO 881
              C---- DO FOR 1-5 (ANTECEDENTS) AND FOR 7-11 (CONSEQUENTS)
0141              MM = (LL - 1) * 6
              C---- FIND ALL CATEGORIES MATCHING THAT BEHAVIOR PATTERN AND SET PLACE
              C---- IN CHART = "X"
0142              DO 82 JJ = 1,NCAT
0143              MM = MM + 1
              C---- INDEX INTO CATEGORY RUN
0144              ML = (JJ - 1) * NCATB
              C---- CHECK EACH "RUN" FOR PRESENCE OF THAT BEHAVIOR
0145              DO 80 II = 1,NCATB
0146              ML = ML + 1
0147              IF (IANT(LL) - ICAT(JJ,ML)) 80,81,80
0148           80 CONTINUE
0149              GO TO 82
0150           81 ICHART(MM) = IX
0151           82 CONTINUE
0152              GO TO 85
0153          881 ICHART(6) = IX
              C---- INCREMENT RECORD NUMBER IN APPROPRIATE FILE
0154           85 NUM(J) = NUM(J) + 1
0155              IF (IZ) 903,903,900
              C---- IF NONE OR VISUAL ONLY WAS THE CONSEQUENT THAT CONTINUED
              C---- THROUGHOUT THE SEARCH--BUT WAS ALSO THE BEHAVIOR THAT WAS
              C---- PASSED OVER BEFORE REACHING A VALID ANTECEDENT THEN SET IT ALSO
              C---- IN THE CONTINUE COLUMN AND SET THE LATENCY TO 0
0156          900 IF (IZ .EQ. IANT(2) .AND. IANTL(2) .LE.1) GO TO 901
0157              GO TO 905
0158          901 ICHART(6) = IX
0159              IANTL(2) = 0
0160          905 CONTINUE
0161              M = NUM(J)
              C---- WRITE ANT. LATENCY, CHART OF ANT. CATEGORIES(ICHART1-5), THE VOC
              C---- ONSET PATTERN, CHAT OF CONSEQUENT CATEGORIES(INCL. CONTINUE),
              C---- THE CONSEQUENT LATENCY, M-PROXIMITY CODE (0=IN, 1=OUT), AND THE
              C---- A/CPATTERNS ONTO DISK FILE J
0162              WRITE(J'M)IANTL(1),(ICHART(MM),MM=1,5),IVOC(J,IPAT),(ICHART(MM),
                 1MM=6,11),IANTL(2),IPROX,IANT
              C---- DO SAME FOR INFANT
0163          90 CONTINUE
0164              GO TO 100
              C---- THERE WAS A BREAK SO WIPE OUT PRESENCE OF VOC & CRY PATTERNS
              C---- AND CATEGORIES
0165          99 DO 98 J = 1,2
0166              JPAT(J) = 66
0167          98 KPAT(J) = 0
0168              ICRY1 = 0
              C---- GO TO NEXT SECOND
0169         100 CONTINUE
0170              RETURN
0171              END

              OPTIONS =/OL:/LK:/OP:2
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IAC      1394    (002312)*
.$$$$.   8074    (037424)

**COMPILER ----- CORE**
   PHASE          USED  FREE
DECLARATIVES      00622 15678
EXECUTABLES       01451 12849
ASSEMBLY          01832 17108
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FORTRAN V04.14                14:15:04    26-JUN-76    PAGE    1

0001          SUBROUTINE WR2(LYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,
             1OUG2)
      C-----  SUBROUTINE WR2 PRINTS OUT FREQUENCIES AND AVERAGE LATENCIES
      C-----    FOR VOCAL (AND CRY) ONSETS BY MOTHER AND INFANT  BY PATTERN
      C-----    AND BY CATEGORY; AND CALCULATES PROPORTIONS, ETC.
0002          COMMON IPAGE,LINES,N14,N46,ICOL,IKCOL,KKCOL,NCAT,NCATR,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 ONAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),OUT(4),TOT(4),CT(2),
             1 OBJ(9),MVOC(2,6),NUM(2),IMATN(1000),KFREQ(1000),XDUM(16)
0004          EQUIVALENCE (IMATN(1),IMAT(1,1)),(IFREQ(1,1),KFREQ(1))
0005          ISUM(IA,JA,KA) = (IA-1) * JA + KA
      C-----  NCATR 5 CATEGORIES, 1 M-OUT, 1 TOTAL
0006          NCATR = 7
      C-----  NCATC  5 CATEGORIES 1 CONTINUE, 1 TOTAL
0007          NCATC = 7
      C-----  NRC FOR INDEXING INTO ARRAY LEVEL
0008          NRC = NCATR * NCATC
      C-----  ICAT'S UP TO TOTAL ROW OR COLUMN
0009          ICATC = NCATC - 1
0010          ICATR = NCATR - 1
      C-----  NR, NC, SAME AS NCAT'S BUT 10 PATTERNS
0011          NR = 12
0012          NC = 12
0013          NRC = NR * NC
      C-----  NL 6 LEVELS FOR MOTHER (5 VOC. PATTERN, 1 CATEGORY ONSET)
0014          NL = 6
      C-----  NLRC INDEX INTO SUPRA-LEVEL (MOTHER OR INFANT)
0015          NLRC = NL * NRC
      C-----  NPAT= MOTHER 5 PATTERNS
0016          NPAT = 5
      C-----  I1 START W/ 1ST PATTERN
0017          I1 = 1
      C-----  IJL FOR INDEX INTO NAMES OF OTHER MEMBER OF THE DYAD (HERE
      C-----    FOR INFANT NAMES BECAUSE STARTING W/ MOTHER ONSETS)
0018          IJL = 2
      C-----  L   FOR MOTHER AND INFANT
0019          DO 700 I = 1,2
      C-----  IF INFANT ONSETS IJL = 1 FOR INDEX INTO MOTHER NAMES
0020          IF (I .EQ. 2) IJL = 1
      C-----  0 OUT ARRAY TEMPORARILY USED FOR HOLDING SUMS
0021          IJ = NRC * 4
0022          DO 501 JJ = 1,IJ
0023        501 IMATN(JJ) = 0
      C-----  INDEX INTO MOTHER OR INFANT LEVEL TO BEGIN ON
0024          IRO = ISUM(I,NLRC,0)
      C-----  INDEX INTO ACTOR ARRAY
0025          IS = ISUM(I,2,1)
0026          IS1 = IS + 1
      C-----  INFANT HAS 6 ONSET PATTERNS (4 VOC., 2 CRY)
0027          IF (I .EQ. 2) NPAT = 6
      C-----  I2 M. HAS 5 PATTERNS + 1 CAT.; I. HAS 6 PATTERNS + 2 CAT.
0028          I2 = NPAT + I
      C-----  DO FOR REGULAR PATTERN AND CATEGORY ONSETS, THEN FOR SUMS --- JO
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0024          DO 609 JO = 1,2
      C-----  FILL IN NAMES, LEAVING OUT 1ST ONE
0045          IJ = 4
0051          DO 505 JJ = 1,40
0052          IJ = IJ + 1
0054        505 DNAME(IJ) = PNAME(IJL,JJ)
0056          DO 506 JJ = 1,4
      C-----  PUT 'M-OUT' AS 1ST NAME
0055          DNAME(JJ) = OUT(JJ)
      C-----  PUT 'TOTAL' AS LAST NAME
0056        506 DNAME(JJ+44) = TOT(JJ)
      C-----  DO ANALYSES BY PATTERNS, THEN BY CATEGORIES ----- JT
0057        510 DO 650 JT = 1,2
      C-----  INDEX INTO TYPE ARRAY (PATTERN, CATEGORY)
0058          IT = ISUM(JT,2,1)
0059          IT1 = IT + 1
      C-----  DO FOR EACH PATTERN OR CATEGORY ONSET ---- IO
0060          DO 600 IJ = 11,12
      C-----  1ST SET IR & IC TO PATTERN ROW & COL VALUES
0061          IR = NR
0062          IC = NC
0063          IRC = IR * IC
      C-----  GET INDEX INTO M. OR I. SUPRA-LEVEL
0064          IRO = ISUM(1,NLEC,0)
      C-----  IF WORKING ON SUMS (JO=2)--ALWAYS USE 1ST LEVEL
0065          IF (JO .EQ. 2) IRO = 0
      C-----  INDEX INTO WHICH PATTERN OR CAT. ONSET ON WHICH M. OR I. LEVEL
0066          IRCI = ISUM(IJ,IRC,IRO)
      C-----  CHECK FOR WORKING ON ANALYSIS BY PATTERN OR BY CATEGORY
0067          GO TO (925,565), JT
      C-----  IF ON CATEGORY (JT=2) BEGIN CONVERSION
      C-----  0 OUT NFREQ (1ST PART HOLDS FREQ., 2ND HOLD LATENCIES FOR CAT.)
0069        565 L = MRC * 2
0069          DO 566 JJ = 1,L
0070        566 NFREQ(JJ) = 0
      C-----  COLLAPSE ROW AND COLUMN PATTERNS INTO ROW AND COLUMN CATEGORIES
      C-----    (LEAVING OUT 1ST ROW(M-OUT) AND 1ST COL.(CONTINUE))
0071          DO 595 L = 1,10
0072          DO 595 IBEH = 1,NCAT
0073          IQ = ISUM(IBEH,NCAT8,0)
0074          DO 570 JJ = 1,NCAT8
0075          IQ = IQ + 1
0076          IF (L - ICAT(IJL,IQ)) 570,575,570
0077        570 CONTINUE
0078          GO TO 595
0079        575 DO 590 LL = 1,10
0080          DO 590 LBEH = 1,NCAT
0081          IQ = ISUM(LBEH,NCAT8,0)
0082          DO 580 JJ = 1,NCAT8
0083          IQ = IQ + 1
0084          IF (LL - ICAT(IJL,IQ)) 580,585,580
0085        580 CONTINUE
0086          GO TO 590
      C-----  MI = INDEX INTO CELL FOR CATEGORY (+1 TO PASS M-OUT & CNT)
0087        585 MI = ISUM(IBEH+1,NCATC,LBEH+1)
      C-----  INDEX INTO CELL FOR PATTERN (AGAIN +1)   ML
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0068          ML = ISUM(L+1,NC,LL+1) + IRCT
              C----  ADD FREQUENCIES INTO 1ST LEVEL OF NFREQ
0069          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
              C----  ADD LATENCIES INTO 2ND LEVEL OF NFREQ
0070          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
0071        590 CONTINUE
0072        595 CONTINUE
              C----  SUMS FOR CONTINUE AND M-OUT COLUMN AND ROW
0073          DO 1001 LL = 1,10
0074          DO 1001 LBEH = 1,NCAT
0075          IQ = ISUM(LBEH,NCATB,2)
0076          DO 1000 JJ = 1,NCATB
0077          IQ = IQ + 1
0078          IF (LL - ICAT(IJL,IQ)) 1000,1005,1000
0079        1000 CONTINUE
0080          GO TO 1001
              C----  M-OUT ROW
0081        1005 ML = ISUM(LL+1,NC,1) + IRCT
0082          MM = ISUM(LBEH+1,NCATC,1)
0083          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
0084          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
              C----  CONTINUE COLUMN
0085          ML = ISUM(1,NC,LL+1) + IRCT
0086          MM = ISUM(1,NCATC,LBEH + 1)
0087          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
0088          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
0089        1001 CONTINUE
              C----  M-OUT X CONTINUE CELL
0090          ML = IRCT + 1
0091          MM = 1
0092          NFREQ(MM) = NFREQ(MM) + IMIAC(ML)
0093          NFREQ(MM+MRC) = NFREQ(MM+MRC) + LMIAC(ML)
              C----  COLUMN TOTALS
0094          DO 610 I13 = 1,ICATR
0095          IN = ISUM(I13,NCATC,NCATR)
0096          IN1 = IN - NCATC
0097          DO 610 I10 = 1,ICATC
0098          IN1 = IN1 + 1
0099          NFREQ(IN+MRC) = NFREQ(IN+MRC) + NFREQ(IN1+MRC)
0100        610 NFREQ(IN) = NFREQ(IN) + NFREQ(IN1)
              C----  ROW TOTALS (LEAVING OUT 1ST ROW-- M-OUT)
0101          DO 620 I13 = 1,NCATC
0102          IN = ISUM(NCATR,NCATC,I13)
0103          IN1 = I13
0104          DO 620 I9 = 2,ICATR
0105          IN1 = IN1 + NCATC
0106          NFREQ(IN+MRC) = NFREQ(IN+MRC) + NFREQ(IN1+MRC)
0107        620 NFREQ(IN) = NFREQ(IN) + NFREQ(IN1)
              C----  SET ROWS AND COL. INDICATORS IR, IC, AND IRC FOR CATEGORIES
0108          IR = NCATR
0109          IC = NCATC
              C----  SET TO 1ST ARRAY LEVEL ( AS EACH CAT. COMPUTED, IT'S FORCED
              C----    INTO 1ST "MATRIX" FOR PRINTING
0110          IRO = 0
0111          IRC = IR + IC
0112          IRCT = 0
```

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FORTRAN V06.13                    14:15:54     26-JUN-7.    PAGE     4

0115            DO 658 LL = 1,NPT
0116            IMIAC(LL) = NFREQ(LL)
0117          658 LMIAC(LL) = NFREQ(LL+NPC)
          C-----  CHECKING FOR REG. PATTERNS & CAT.  OR SUMS ----- JO
0118          925 GO TO (515,527), JO
          C-----  ON SUMS   ... IF ON INFANT, 2ND IJ WILL BE CRY SUMS
0119          527 IF (I .EQ. 2 .AND. IJ .GT. 1) GO TO 528
          C-----  INDEX TO "VOCAL"
0120            NA = ISUM(1,4,1)
0121            GO TO 529
          C-----  INDEX TO "CRY"
0122          528 NA = ISUM(3,4,1)
          C-----  END OF SUMS NAME INDEX
0123          529 NB = NA + 3
          C-----  INDEX INTO WHICH INITIAL HEADING
0124            IP = 0
          C-----  0002 = "SUMS"
0125            OUG = OUG2
          C-----  INDEX TO TYPE ARRAY FOR PATTERN VS CATEGORY ONSET
0126            IY = ISUM(1,2,1)
0127            IY1 = IY + 1
          C-----  SKIP OVER TO 530 (FOLLOWING FOR JO = 1)
0128            GO TO 530
          C-----  HERE FOR JO = 1  IJ DOING REGULAR PATTERN OR CAT ONSETS
          C-----  IF IJ>NPAT THEN IT'S A CATEGORY ONSET  (IJ LOOP FOR ONSETS)
0129          515 IF (IJ - NPAT) 516,516,517
          C-----  JJJJ CATEGORY ONSET
          C-----  INDEX INTO HEADING ("CATEGORY" ONSET
0130          517 IP = 1
          C-----  INDEX INTO TYPE ARRAY SO "CATEGORY" ONSET
0131            IY = ISUM(2,2,1)
0132            IY1 = IY + 1
          C-----  CHECKING ON INFANT - WHETHER VOCAL OR CRY CATEGORY
          C-----     IF VOC-IJ=NPAT+1,  IF CRY-IJ=NPAT+2
          C-----  MOTHER ALWAYS VOCAL CAT ONSET
0133            IF ( I .EQ. 2 .AND. IJ .GT. NPAT + 1) GO TO 998
          C-----  VOCAL INDEX FROM NAMES
0134            NA = ISUM(1,4,1)
0135            GO TO 997
          C-----  CRY INDEX FROM NAMES
0136          998 NA = ISUM(4,4,1)
0137          997 NB = NA + 3
          C-----  SKIP TO 530 (FOLLOWING IS REG. PATTERN ONSET)
0138            GO TO 530
          C-----  JJJJ PATTERN ONSET
          C-----  INDEX  INTO TYPE ARRAY ("PATTERN")
0139          516 IY = ISUM(1,2,1)
0140            IY1 = IY + 1
          C-----  INDEX TO HEADING -- PATTERN ONSET
0141            IP = 0
          C-----  0001 = "     " (BLANK- WILL NOT PRINT "SUMS")
0142            OUG = 0001
          C-----  INDEX INTO NAME OF PATTERN ONSET
0143            IE = MVOC(I,IJ)
0144            NA = ISUM(IE,4,1)
0145            NB = NA + 3
```

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FORTRAN V06.13                    14:15:04    28-JUN-74    PAGE     5

      C----   JJ PREPARE INDEX INTO SUMMING ARRAY
      C----   IA AND IB ARE INDEXES INTO THE TEMPORARY ARRAY TO HOLD SUMS
      C----     OVER PATTERN (INTO ARRAY IMATN)
      C----   CHECKING TO DIVIDE INTO VOCAL AND CRY FOR INFANT, MOTHER ALWAYS
      C----       VOCAL
0144          GO TO (525,520), I
0145        520 IF (IJ .LE. 4) GO TO 525
      C----   IJ >4 IT IS A CRY PATTERN SO SKIP INTO 2ND SECTION OF TEMP.
      C----     IMAT ARRAY
      C----     IMATN ARRAY 2* #ELEMENTS FOR FREQ., 3* FOR LATENCIES
0146          IA = 2 * IRC
0147          IB = 3 * IRC
0148          GO TO 530
      C----   VOCAL PATTERN, INTO 1ST FOR FRQ., 2ND FOR LATENCIES
0149        525 IA = 0
0150          IB = IRC
      C----   GET TOTAL FREQ. FOR THE PARTICULAR M-I X ONSET "MATRIX"
0151        530 JSUM = IRCT + IRC
0152          JSUM = IMIAC(JSUM)
0153          NB = 3
      C----   DO 3 ANALYSES ACCORDING TO FORMATS 533,535, AND 537
0154          DO 561 II = 1,NB
0155          IPAGE = IPAGE + 1
0156          IF (IP .NE. 0) GO TO 993
      C----   PRINT HEADING FOR A PATTERN OR A SUMS ONSET
0157          WRITE(LINES,551) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),ONC,(TYPE(JJ),
             1 JJ=IY,IY1),(PNAME(I,JJ),JJ=NA,NB),(TYPE(JJ),JJ=IT,IT1)
0158        551 FORMAT('1  PAGE',I4,'  DYAD NO. ',2A4//3X,2A4,': '  ,A4,'  '2A4,'
            1ONSET = '4A4//'    ANALYSIS BY '2A4)
0159          GO TO 989
      C---- PRINT HEADING FOR A CATEGORY ONSET
0160        993 WRITE(LINES,991) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),(TYPE(JJ),JJ=IY,
             1 IY1),(CNAME(I,JJ),JJ=NA,NB),(TYPE(JJ),JJ=IT,IT1)
0161        991 FORMAT('1  PAGE',I4,'  DYAD NO. ',2A4//3X,2A4,': ',2A4,' ONSET = '
             1 4A4//'    ANALYSIS BY ',2A4)
      C----   PRINT ANALYSIS HEADING
0162        989 GO TO (532,534,536), II
0163        532 WRITE(LINES,533)
0164        533 FORMAT('   FREQUENCY')
0165          GO TO 538
0166        534 WRITE(LINES,535)
0167        535 FORMAT('   AVERAGE LATENCY')
0168          GO TO 538
0169        536 WRITE(LINES,537)
0170        537 FORMAT('   PROPORTION OF TOTAL FREQUENCY TO EACH ANTECEDENT')
      C----   IC'S ARE FOR PRINTING LINE LENGTHS FOR PATTERN OR CATEGORY
0171        538 ICX = IC - 2
0172          ICY = IC - 1
0173          ICL = IC * 7 + 20
0174           ICZ = ICL - 21
      C----   FINISH HEADING
0175          WRITE(LINES,539) (JJ,JJ=2,ICY)
0176        539 FORMAT(//32X,'CONSEQUENT'/33X,<ICZ>('-')/2X'ANTECEDENT',13X,
             1'CNT',<ICX>I7,4X,'TOT'/ 1X, <ICL>('-'))
      C----   DO FOR THE NUMBER OF ROWS (12 FOR PATTERN, 7 FOR CATEGORY ANALY.)
0177        954 DO 560 III = 1,IR
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FORTRAN V06.13                    14:15:04     20-JUN-79    PAGE    9

      C----  INDEX INTO BEHAVIOR NAME
0178        ID = ISUM(III,4,1)
0179        ID1 = ID + 5
      C----  JCOL = 1ST CELL OF ROW
0180        JCOL = ISUM(III,IC,IRCT) + 1
      C----  JCOL1 = LAST CELL OF ROW
0181        JCOL1 = JCOL + (IC - 1)
      C----  SPLIT ACCORDING TO ANALYSIS
0182        GO TO (540,545,550), IA
      C----  PRINT FREQUENCY ROW
0183      540 WRITE(LINES,541) III,(DNAME(JJ),JJ=ID,ID1),(IMIAC(JJ),JJ=JCOL,
           1 JCOL1)
0184      541 FORMAT(I3,1X,4A4,1X,12I7)
      C----  IF DOING CATEGORY ONSET SKIP OVER PATTERN SUMMING SECTION
0185      953 IF (IP .NE. 0) GO TO 560
      C----  JO = 1 START COLLECTING SUMS (MAYBE-SEE NEXT IF); JO = 2 SKIP
0186        GO TO (508,560), JO
      C----  JT = 1 ANALYSIS BY PATTERN SO DO THE SUMMING, IF JT=2 SKIP (IT'S
      C----    ANALYZING BY CATEGORY)
0187      508 GO TO (542,560), JT
      C----  ADD INTO PATTERN SUMS FOR THAT ROW
0188      542 DO 543 JJ = JCOL,JCOL1
0189        IA = IA + 1
0190        IB = IB + 1
      C----  FREQUENCY
0191        IMATN(IA) = IMATN(IA) + IMIAC(JJ)
      C----  LATENCY
0192      543 IMATN(IB) = IMATN(IB) + LMIAC(JJ)
0193        GO TO 560
0194      545 JJ = 0
      C----  AVERAGE LATENCY-- DIVIDE  TOTAL LATENCIES BY FREQUENCY
0195        DO 546 J = JCOL,JCOL1
0196        JJ = JJ + 1
0197        XD = LMIAC(J)
0198      546 XDUM(JJ) = XD / IMIAC(J)
0199        WRITE(LINES,547) III,(DNAME(JJ),JJ=ID,ID1),(XDUM(JJ),JJ=1,IC)
0200      547 FORMAT(I3,1X,4A4,1X,12F7.1)
0201        GO TO 560
0202      550 J = 0
      C----  PROPORTIONS--DIVIDE EACH FREQ. BY ROW TOTAL
0203        L = JCOL1 - 1
0204        DO 551 JJ = JCOL,L
0205        J = J + 1
0206        XD = IMIAC(JJ)
0207      551 XDUM(J) = XD / IMIAC(JCOL1) * 100.
0208        XD = IMIAC(JCOL1)
      C----  DIVIDE ROW TOTAL BY "MATRIX" TOTAL
0209        XDUM(J+1) = XD / JSUM * 100.
0210        WRITE(LINES,547) III,(DNAME(JJ),JJ=ID,ID1),(XDUM(JJ),JJ=1,IC)
      C----  GO TO NEXT ROW
0211      560 CONTINUE
      C----  GO TO NEXT ANALYSIS
0212      561 WRITE(LINES,742)
0213      742 FORMAT(1X,<ICL>('-'))
0214      600 CONTINUE
      C----  CHECKING FOR PATTERN OR CAT ANALYSIS
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[illegible] V06.1[illegible]                14:15:09    28-JUN-75    PAGE    7

0215            GO TO (556,650), JI
                C----  IF IT WAS PATIENT--CHANGE NAMES TO CATEGORY NAMES
0216          556 LL = 4
0217              DO 564 JJ = 1,20
0218              LL = LL + 1
0219          564 UNAME(LL) = CNAME(IJL,JJ)
                C----  CHANGE LAST NAME TO "TOTAL"
0220              DO 566 LL = 1,4
0221          566 UNAME(LL+24) = TOT(LL)
0222          650 CONTINUE
0223              GO TO (640,639), JO
                C----  IF JO=1, HAVE JUST FINISHED REG PAT. AND CAT., SWITCH [illegible]CES
                C----    TO SEND SUMS THROUGH THE LOOP
                C----  CHECK IF ON MOTHER(I=1) OR INFANT(I=2)
0224          640 IF (I - 2) 652,651,651
                C----  IF ON INFANT, NEED TO DO TWICE (FOR VOC & CRY)
0225          651 I2 = 2
0226              GO TO 653
                C----  IF ON MOTHER--JUST ONCE FOR VOCAL
0227          652 I2 = 1
0228          653 IEND = NRC
0229              DO 654 LL = 1,I2
                C----  REFILL MATRICES W/SUMS (VOCAL SUMS USE 1ST LEVEL--> "MATRICES";
                C----    CRY SUMS USE 2ND LEVEL
0230              JJ = ISUM(LL,2*NRC,0)
0231              JM = ISUM(LL,NRC,0)
0232              DO 654 LK = 1,IEND
0233              JJ = JJ + 1
0234              JM = JM + 1
                C----  JJ'S FOR FREQUENCIES, JJ+NRC'S FOR LATENCIES
0235              IMIAC(JM) = IMATN(JJ)
0236          654 LMIAC(JM) = IMATN(JJ+NRC)
0237          639 CONTINUE
0238          700 CONTINUE
0239              RETURN
0240              END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK        LENGTH
        NR2      2797    (012732)*
        .$$$$.   8074    (037424)

        **COMPILER ----- CORE**
           PHASE        USED  FREE
        DECLARATIVES  00622 13678
        EXECUTABLES   01873 12427
        ASSEMBLY      02564 16376
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FORTRAN V06.13                    14:21:01    28-JUN-74    PAGE     1

0001          SUBROUTINE WR3(DYAD,ACTOR,TYPE,OBJ,ICAT,OUT,TOT,MVOC,CT,NUM,OUG1,
             1OUG2)
      C----    SUBROUTINE WR3 CALCULATES AND PRINTS THE DISTRIBUTION OF
      C----      LATENCIES FOR EACH VOCAL OR CRY PATTERN ONSET (CATEGORY ONSETS
      C----      ARE LOST BECAUSE THE FILE DOES NOT CONTAIN THAT INFORMATION
      C----      IT READS EACH ONSET FROM A DISK FILE, COMPILES THE "MATRICES"
      C----      (ACTUALLY IT'S A STRUNG OUT ARRAY) ; PRINTS FREQUENCIES,
      C----      PROPORTIONS, MEANS AND SD'S, AND GIVES SUMMARY MATRICES
      C----      OVER PATTERN ONSETS .... DOES THIS FOR MOTHER AND INFANT
      C----      PERFORMS ANALYSIS BY PATTERN AND BY CATEGORY
      C----      CALCULATES ONLY ACCORDING TO CONSEQUENT AND OMITS M-OUT ONSETS
0002          COMMON IPAGE,LINES,N16,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 ONAME(60),KFREQ(15),KDUR(15),IMAT(2,500),IFREQ(2,500),IDUR(2,500)
             3 ,JFREQ(2,240),IMIAC(2016),LMIAC(2016),LAST(12)
0003          DIMENSION DYAD(2),ACTOR(4),TYPE(4),ICAT(2,40),OUT(4),TOT(4),CT(2),
             1 OBJ(9),MVOC(2,6),NUM(2),IMATN(1056),NFREQ(1000),XDUM(16)
0004          DIMENSION AM(2), SM(2)
0005          EQUIVALENCE (IMATN(1),LMIAC(1)),(IFREQ(1,1),NFREQ(1))
0006          DATA AM, SM/'MEAN','    ',' SD','    '/
0007          ISUM(I8,J8,K8) = (I8-1) * J8 + K8
      C----    NR      = 11 ROWS (10 CONSEQUENT PATTERNS + 1 TOTAL)
0008          NR = 11
      C----    NCATR  6 ROWS (5 CATEGORIES + 1 TOTAL)
0009          NCATR = 6
      C----    12 COLUMNS (LATENCIES 0-10 + 1 TOTAL)
0010          NC = 12
0011          NRC = NR * NC
      C----      MOTHER HAS 5 VOCAL ONSET PATTERNS
0012          NPAT = 5
      C----    JL USED FOR INDEX INTO PATTERN OR CATEGORY NAMES OF OTHER MEMBER
      C----      OF THE PAIR
0013          JL = 2
      C----    DO FOR MOTHER AND INFANT
0014          DO 3300 J = 1,2
      C----    IF ON INFANT JL TO INDEX MOTHER NAMES
0015          IF (J .EQ. 2) JL = 1
      C----    0 OUT TEMPORARY ARRAY FOR HOLDING UP TO 8 "MATRICES"
0016          DO 3005 M = 1,1056
0017       3005 IMATN(M) = 0
0018          IPAGE = IPAGE + 1
      C----    INDEX INTO ACTOR ARRAY (MOTHER OR INFANT)
0019          IS = ISUM(J,2,1)
0020          IS1 = IS + 1
      C----    PRINT HEADING-- CT(1) = TPLAY(FOR MOTHER), (2) = CRY (INFANT)
0021          WRITE(LINES,3006)IPAGE,DYAD,(ACTOR(M),M=IS,IS1) ,CT(JL), CT(JL)
0022       3006 FORMAT('1' PAGE',I4,'  DYAD NO. ',2A4/3X,2A4,': LISTING OF VOCAL O
             1NSETS', ' (IF PROX = 1, MOTHER WAS OUT OF ROOM AT ONSET)'//
             215X,'ANTECEDENT',31X,'CONSEQUENT'/4X,32('-'),11X,39('-')/4X,'LATEN
             3CY'2X,'VOC',2X,'VIS'2X,'SMI'1X,A4,1X'NONE'3X'ONSET',5X,'CNT'2X,'VO
             4C'2X,'VIS',2X,'SMI',1X,A4,1X,'NONE'2X,'LATENCY',2X,'PROX'3X,'A-C')
0023          WRITE(LINES,3007)
0024       3007 FORMAT(4X,95('-'))
      C----    N = NUMBER OF RECORDS IN M. OR I. FILE
0025          N = NUM(J)
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C----  DO FOR EACH RECORD
       DO 3020 M = 1,N
C----  READ ANT. LATENCY, ANTECEDENT CATEGORY CHART(SEE SUB IAC),
C----    ONSET PATTERN-KON, CONSEQUENT CATEGORY CHART, CONSEQ. LATENCY,
C----    M=IN -IP=0, OR OUT -IP=1, AND ANT. AND CONSEQ. PATTERN
       READ(J'M)L1,(LAST(I),I=1,5),KON,(LAST(I),I=6,11),L2,IP,(JPAT(I),
      1 I=1,2)
C----  PRINT THIS INFORMATION
       WRITE(LINES,3008)L1,(LAST(I),I=1,5),KON,(LAST(I),I=6,11),L2,IP,
      1 (JPAT(I),I=1,2)
 3008  FORMAT(9X,I2,2(4X,A1),4X,I2,5X,6(4X,A1),7X,I2,3X,I1,2XI2,'-',I2)
C----  IF MOTHER OUT (IP=1) DO NOT INCLUDE IN COMPUTATION
       IF (IP .EQ. 1) GO TO 3020
C----  I1 = CONSEQUENT, IF=0-BEHAV. CONTINUED--SO USE ANTECEDENT
       I1 = JPAT(2)
       IF (I1 .EQ. 0) I1 = JPAT(1)
C----  INDEX INTO  ARRAY LEVEL FOR THIS PATTERN ONSET "MATRIX"
C----    ANT PATTERN NUMBER AND MAKE IT 1-6
       DO 3010 I = 1,6
       IF(KON - MVOC(J,I)) 3010,3015,3010
 3010  CONTINUE
C----  USING I INDEX, GET INTO PROPER LEVEL = KON
 3015  KON = ISUM(I,NRC,0)
C----  MAT=INDEX INTO CONSEQ. X LATENCY CELL (ADD 1 SO 0-10 = 1-11 INTO
C----    INDEX
       MAT = KON + ISUM(I1,NC,L2+1)
C----  ADD FREQUENCY
       IMATN(MAT) = IMATN(MAT) + 1
C----  ROW TOTAL INDEX AND ADD INTO ROW TOTAL FREQ. CELL
       MAT = KON + ISUM(I1,NC,NC)
       IMATN(MAT) = IMATN(MAT) + 1
C----  GET NEXT RECORD
 3020  CONTINUE
       WRITE(LINES,3007)
       I1 = 1
C----  IF ON INFANT J=2-- INFANT HAS 6 PATTERNS
       IF (J .EQ. 2) NPAT = 6
C----  I2 FOR 3140 LOOP FOR THE NUMBER OF PATTERNS
       I2 = NPAT
C----  NLRC = LEVEL INTO SUMMING
       NLRC = ISUM(NPAT+1,NRC,0)
C----  DO FOR PATTERNS, THEN FOR SUMS ------  JO
       DO 3200 JO = 1,2
C----  PUT IN PATTERNS NAMES FOR THE OTHER MEMBER
       DO 3025 JJ = 1,40
 3025  DNAME(JJ) = PNAME(JL,JJ)
C----  LAST NAME = "TOTAL"
       DO 3289 JJ = 1,4
 3289  DNAME(JJ+40) = TOT(JJ)
C----  DO BY PATTERN, THEN BY CATEGORY ----  JT
       DO 3190 JT = 1,2
C----  INDEX INTO TYPE ARRAY (PATTERN OR CAT.)
       IT = ISUM(JT,2,1)
       IT1 = IT + 1
C----  DO BY NUMBER OF PATTERNS (5 OR 6), OR      SUMS (1 OR 2) FOR
C----    MOTHER AND INFANT, RESPECTIVELY ------    IJ
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```
3055          DO 3140 IJ = 11,12
      C-----   SET TO PATTERN -- IR,IC, AND MRC INDEX
3056          IR = NR
3057          IC = NC
3058          MRC = MRC
      C-----   CHECK JT FOR PATTERNS OR CATEGORY
3059          GO TO(3070,3030), JT
      C-----   JJJ CATEGORY ANALYSIS
      C-----   IRC INDEX INTO WHICH "MATRIX" TO CONVERT
3060    3030 IRC = ISUM(IJ,MRC,0)
      C-----   0 OUT TEMPORARY CATEGORY ARRAY
3061          DO 3031 K = 1,NRC
3062    3031 NFREQ(K) = 0
      C-----   CONVERT TO CATEGORIES
3063          DO 3060 M1 = 1,10
      C-----   K1 INDEX INTO PATTERN CELL
3064          K1 = ISUM(M1,NC,IRC)
3065          DO 3060 JJ = 1,NCAT
      C-----   K2 INDEX INTO CATEGORY CELL (ALWAYS ON 1ST LEVEL)
3066          K2 = ISUM(JJ,NC,0)
3067          IL = ISUM(JJ,NCATG,0)
3068          DO 3035 K = 1,NCATG
3069          IL = IL + 1
3070          IF (M1 - ICAT(JL,IL)) 3035,3040,3035
3071    3035 CONTINUE
3072          GO TO 3060
      C-----   WHEN MATCH FOUND - DO FOR ALL COLUMNS
3073    3040 DO 3045 K = 1,NC
3074    3045 NFREQ(K2+K) = NFREQ(K2+K) + IMATN(K1+K)
3075    3060 CONTINUE
      C-----   CHANGE NUMBER OF ROWS TO NUMBER OF CATEGORY ROWS
3076          IR = NCATR
3077          IRC = IR * IC
      C-----   PUT CATEGORY "MATRIX" IN 1ST PATTERN "MATRIX"
3078          DO 3065 K = 1,IRC
3079    3065 IMATN(K) = NFREQ(K)
      C-----   SINCE CATEGORY IS ON 1ST LEVEL, KEEP MRC = 0 (LEVEL INDEX INTO
      C-----     ARRAY)
3080          MRC = 0
      C-----   JR FOR ALL ROWS BUT TOTAL
3081    3070 JR = IR - 1
      C-----   GET INDEX INTO PROPER LEVEL OF ARRAY FOR "MATRIX"--- IRC
3082          IRC = ISUM(IJ,MRC,0)
      C-----   IF DOING SUMS (JO=2) AND ANALYSIS BY PATTERN (JT=1) SKIP COL.
      C-----     SUMMING SECTION
3083          IF (JO .EQ. 2 .AND. JT .EQ. 1) GO TO 3076
      C-----   COLUMN TOTALS
3084          DO 3075 I13 = 1,NC
3085          IN = IRC + ISUM(IR,NC,I13)
3086          IN1 = I13 - NC + IRC
3087          DO 3075 I9 = 1,JR
3088          IN1 = IN1 + NC
3089    3075 IMATN(IN) = IMATN(IN) + IMATN(IN1)
3090    3076 CONTINUE
      C-----   IF PATTERN OFFSETS (JO=1) SKIP, IF SUMS (JO=2) GET CORRECT HEADING
3091          GO TO (3090,3060), JO
```

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FORTRAN V06.14                    14:21:01     28-JUN-74    PAGE     4

      C----  INDEX FOR SUMS NAME WILL COME FROM THE PNAME MATRIX
      C----  IF ON INFANT(IJ=2) HEADING IS "CRY", ELSE HEADING IS "VOCAL"
3092   3090 IF(J .EQ. 2 .AND. IJ .GT. 1) GO TO 3085
      C----  GET INDEX INTO VOCAL NAME
3093         NA = ISUM(1,4,1)
3094         GO TO 3086
      C----  GET INDEX INTO CRY NAME
3095   3085 NA = ISUM(9,4,1)
      C----  END OF NAME INDEX
3096   3086 NB = NA + 3
      C----  OUG2="SUMS"
3097         OUG = OUG2
      C----  SKIP PATTERNS SECTION AND GO TO PRINTING
3098         GO TO 3100
      C----  JJJJ REGULAR PATTERN ONSET
      C----  OUG1="    " I.E., NOTHING WILL BE PRINTED INSTEAD OF "SUMS"
3099   3090 OUG = OUG1
      C----  INDEX INTO NAME OF PATTERN ONSET
3100         IE = MVOC(J,IJ)
3101         NA = ISUM(IE,4,1)
3102         NB = NA + 3
      C----  IA = INDEX INTO LEVEL OF ARRAY FOR SUMS (WILL BE LAST "MATRIX")
3103   3100 IA = NPAT * MRC
      C----  IF PATTERN = INFANT(J=2) AND A CRY(IJ>4), SKIP 1ST SUMS
      C----    MATRIX AND GO TO NEXT LEVEL (ADD MRC)
3104         IF (J .EQ. 2 .AND. IJ .GT. 4) IA = IA + MRC
      C----  II DO ANALYSIS INDICATED BY FORMATS 3103, AND 3105
3105         DO 3130 II = 1,2
3106         IPAGE = IPAGE + 1
      C----  PRINT INITIAL HEADING
3107         WRITE(LINES,1101) IPAGE,DYAD,(ACTOR(JJ),JJ=IS,IS1),OUG,
            1 (PNAME(J,JJ),JJ=NA,NB),(TYPE(JJ),JJ=IT,IT1)
3108    1101 FORMAT('1  PAGE',I4,'  DYAD NO. ',2A4//3X,2A4,': ',A4,' PATTERN ON
            1SET = ',4A4//'   ANALYSIS BY ',2A4)
      C----  ICL = LENGTH OF LINE TO PRINT
3109         ICL = 101
3110         IF (II .EQ. 2) ICL = ICL - 13
      C----  PRINT ANALYSIS HEADING
3111         GO TO (3102,3104), II
3112   3102  WRITE(LINES,3103)
3113   3103  FORMAT('  FREQUENCY DISTRIBUTION OF LATENCIES')
3114         GO TO 3106
3115   3104  WRITE(LINES,3105)
3116   3105  FORMAT('  PROPORTION OF FREQUENCY TO EACH CONSEQUENT')
      C----  COMPLETE HEADING (AM,  & SM USED TO PRINT "MEAN" AND "SD" FOR 1ST
      C----    ANALYSIS (II=1)
3117   3106  WRITE(LINES,3107) (JJ,JJ=1,10),AM(II),SM(II)
3118   3107  FORMAT(//32X,'LATENCY'//17X,66('-')/2X'CONSEQUENT'10X,'0',10I6,3X'
            1TOT'3X,A4,2X,A4/1X,<ICL>('-'))
      C----  JSUM = TOTAL FREQ. CELL, THEN CONTENTS OF THAT CELL FOR GIVEN
      C----    "MATRIX"
3119         JSUM = IR * NC + IRC
3120         JSUM = IMATR(JSUM)
3121         ANA = JSUM
      C----  III  DO FOR EACH ROW
3122         DO 3129 III = 1,IR
```

```
FORTRAN IV V01.13                14:21:01     28-JUL-76    PAGE    3

      C----  INDEX INTO NAME OF BEHAVIOR CONSEQUENT
0123        IU = ISUM(III,4,1)
0124        IU1 = IU + 3
      C----  JCOL = 1ST CELL OF ROW
0125        JCOL = ISUM(III,NC,IRC) + 1
      C----  JCOL1 = LAST CELL OF ROW
0126        JCOL1 = JCOL + NC - 1
      C----  MCOL = LAST CELL OF ROW (NOT INCLUDING TOTALS)
0127        MCOL = JCOL1 - 1
      C----  IF ON 1ST ANALYSIS, GET MEAN AND SD INFO. (SD OF POPULATION)
0128        GO TO (3110,3120), II
      C----  GET SUMS, AND SUM OF SQUARES
0129    3110 EX = 0
0130        EX2 = 0
      C----   IMATN HOLDS THE FREQ. AND IZ IS THE SCORE
0131        IZ = 0
0132        DO 3115 JJ = JCOL,MCOL
0133        IF(IMATN(JJ) .EQ. 0) GO TO 3115
0134        EX = EX +  (IZ * IMATN(JJ))
0135        EX2 = EX2 + IMATN(JJ) * IZ * IZ
0136    3115 IZ = IZ + 1
0137        AN = IMATN(JCOL1)
      C----  MEAN
0138        AMEAN = EX / AN
      C----  SD OF POPULATION
0139        SD = ABS((EX2-AN*AMEAN**2)/(AN-1.))
0140        SD = SQRT(SD)
      C----  PRINT ROW, MEAN, AND SD
0141        WRITE(LINES,116)(DNAME(JJ),JJ=IU,IU1),(IMATN(JJ),JJ=JCOL,JCOL1),
           1AMEAN,SD
0142     116 FORMAT(1X,4A4,12I6,F7.2,F6.2)
      C----  IF PATTERN UNSETS (JU=1) & ANALYSIS BY PATTERN (JT=1) THEN
      C----    COLLECT SUMS
0143        GO TO (3117,3129), JU
0144    3117 GO TO (3118,3129), JT
      C----  IF SUMMING OVER ALL COLUMNS IN THE ROW
0145    3118 DO 3119 JJ = JCOL,JCOL1
0146        IA = IA + 1
0147    3119 IMATN(IA) = IMATN(IA) + IMATN(JJ)
      C----  GO TO NEXT ROW
0148        GO TO 3129
      C----  ANALYSIS BY PROPORTIONS
      C----  AN = ROW TOTAL
0149    3120 AN = IMATN(JCOL1)
0150        JA = 0
      C----  PERCENT OF EACH COL. OF ROW TOTAL
0151        DO 3125 JJ = JCOL,MCOL
0152        JA = JA + 1
0153    3125 XDUM(JA) = IMATN(JJ) / AN * 100.
      C----  ROW TOTAL DIVIDED BY "MATRIX" TOTAL *100
0154        XDUM(JA+1) = IMATN(JJ) / ANA * 100.
0155        WRITE(LINES,3136)(DNAME(JJ),JJ=IU,IU1),(XDUM(JJ),JJ=1,NC)
0156    3136 FORMAT(1X,4A4,12F6.1)
      C----  GO TO NEXT ROW
0157    3129 CONTINUE
      C----  GO TO NEXT ANALYSIS
```

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FORTRAN V06.14                    14:21:01     28-JUN-79    PAGE     6

0158       3130 WRITE (LINES,3131)
0159       3131 FORMAT(1X,<ICL>('-'))
           C----  GO TO NEXT ONSET
0160       3140 CONTINUE
           C----  CHECK JT  IF = 1 PREPARE FOR SWITCH TO USE CATEGORIES
0161             GO TO (3132,3150), JT
           C----  JJ CATEGORY ANALYSIS
           C----  CONVERT TO CATEGORY NAMES
0162       3132 DO 3133 JJ = 1,20
0163       3133 DNAME(JJ) = CNAME(JL,JJ)
           C----  LAST ROW OF NAMES = "TOTAL"
0164             DO 1334 JJ = 1,4
0165       1334 DNAME(JJ+20) = TOT(JJ)
           C----  GO TO CATEGORY ANALYSIS
0166       3150 CONTINUE
           C----  IF JO = 1, HAVE JUST FINISHED PATTERN ONSETS, SO PREPARE FOR
           C----     TO SUMS
0167             GO TO (3155,3200), JO
           C----  CHECK IF ON MOTHER (J=1) OR INFANT (J=2)
0168       3155 IF(J - 2) 3157,3156,3156
           C----  INFANT HAS 2 SUMS, SO CONVERT FOR TWO LEVELS (2*NRC), & DO IJ 2X
0169       3156 IEND = 2 * NRC
0170            I2 = 2
0171            GO TO 3158
           C----  MOTHER ONLY HAS 1 SUM
0172       3157 IEND = NRC
0173            I2 = 1
           C----  PUT SUMS (LAST LEVELS OF THE ARRAY) II TO THE 1ST LEVEL AND 2ND(IF
           C----     INFANT-- FOR DRY SUMS)
0174       3158 DO 1159 LL = 1,IEND
0175       1159 IMATN(LL) = IMATN(LL+NLRC)
           C----  GO TO SUMS
0176       3200 CONTINUE
           C----  GO TO INFANT
0177       3300 CONTINUE
0178            RETURN
0179            END

         ROUTINES CALLED:
         ABS     , SQRT

         OPTIONS =/ON,/CK,/OP:2

         BLOCK        LENGTH
         .R3      2497    (011602)*
         **$$$.   8074    (037424)

         **COMPILER ----- CORE**
            PHASE       USED  FREE
         DECLARATIVES 00622 13678
         EXECUTABLES  01872 12428
         ASSEMBLY     02528 10412
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FORTRAN V06.13                    14:24:08    28-JUN-74    PAGE     1

0001          SUBROUTINE WR4(LINES,I,IT,ADUM)
      C----    SUBROUTINE WR4 PRINTS TRANSITION MATRICES, EITHER INTEGER OR REAL
      C----      ACCORDING TO THE ARGUMENTS SENT BY WR5
      C----    IT = INTEGER MATRIX
      C----    ADUM = REAL MATRIX
      C----    I INDICATES WHETHER TO USE IT OR ADUM
      C----
0002          DIMENSION IT(7,7),ADUM(7,7), AROW(2,3)
0003          DATA AROW/' -VO',' CAL ',' -NO',' VOC',' -CR',' Y   '/
      C----    N7 = NUM. OF ROWS AND COLUMNS
0004          N7 = 5
      C----    PRINT HEADING
0005          WRITE(LINES,1)
0006        1 FORMAT(/19X,'MOTHER VOC', 4X,'MOTHER NO VOC'/16X,14('-'),3X,
             114('-')/1X'MOTHER  INFANT-',2(' VOCAL  NOVOC - '),       ' TOTAL
             2 ')
0007          WRITE(LINES,2)
0008        2 FORMAT(1X,65('-'))
      C----    IF I<3, THEN AN INTEGER MATRIX, IF >3 THEN REAL
0009          IF (I - 3) 4,4,50
0010        4 DO 15 J = 1,2
      C----    WORK ON TWO ROWS AT A TIME-- 1ST VOC, 2ND NO VOC FOR MOTHER
0011          GO TO (5,7), J
0012        5 WRITE(LINES,6)
0013        6 FORMAT(' VOCAL')
0014          GO TO 9
0015        7 WRITE(LINES,8)
0016        8 FORMAT(' NO VOC')
      C----    INDEX INTO WHICH 2 INFANT SUBROWS, VOC & NO VOC - UNDER M, ROW
0017        9 M = (J-1) * 2 + 1
0018          M1 = M + 1
      C----    L INDEX TO INFANT "VOC" OR "NO VOC"-- IN MATRIX AROW
0019          L = 0
0020          DO 14 LL = M,M1
0021          L = L + 1
0022       14 WRITE(LINES,13)(AROW(K,L),K=1,2),(IT(LL,K),K=1,N7)
0023       13 FORMAT(7X,2A4,'-',2(2I7,' - '),I7)
0024       15 WRITE(LINES,87)
0025       87 FORMAT(7X,55('-'))
      C----    PRINT TOTALS ROW
0026          WRITE(LINES,18) (IT(5,K),K=1,N7)
0027       18 FORMAT(' TOTAL',9X,'-',2(2I7,' - '),I7)
0028          WRITE(LINES,2)
0029          RETURN
      C----    SAME AS ABOVE BUT FOR A REAL MATRIX
0030       50 DO 60 J = 1,2
0031          GO TO (51,52), J
0032       51 WRITE(LINES,6)
0033          GO TO 53
0034       52 WRITE(LINES,8)
0035       53 M = (J-1) * 2 + 1
0036          M1 = M + 1
0037          L = 0
0038          DO 64 LL = M,M1
0039          L = L + 1
```

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FORTRAN 77(1.1                    14:24:08     28-JUL-74    PAGE    2

0040        64 WRITE(LINES,65)(AROW(K,L),K=1,2),(AJUM(LL,K),K=1,N7)
0041        65 FORMAT(/X,'A4',T=',2(F7.2,' - '),F7.2)
0042        66 WRITE(LINES,67)
0043           WRITE(LINES,69)(AJUM(L,K),K=1,N7)
0044        69 FORMAT(' TOTAL'9X,'=',2(2F7.2,' - '),F7.2)
0045           WRITE(LINES,2)
0046           RETURN
0047           END

        OPTIONS =/ON,/CK,/OP:2

        BLOCK        LENGTH
        WK4     627     (002346)*

        **COMPILER ----- CORE**
           PHASE       USED  FREE
        DECLARATIVES 00622 13678
        EXECUTABLES  00863 13437
        ASSEMBLY     01371 17569
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F4 (FCAT V06.13                    14:25:12    28-JUN-74    PAGE     1

0001          SUBROUTINE WR5(DYAD,ADUM,NSTEP,SEXT,N5)
      C----    SUBROUTINE WR5 PREPARES THE TRANSITION MATRICES DERIVED FROM
      C----      SUBROUTINE MATS FOR PRINTING IN SUB. WR4. IT ALSO COLLAPSES
      C----      THE TRANSITION MATRIX OF PROBABILITIES (FROM ITRAN) INTO SEXT
      C----      AND WILL PRINT OUT SEXT WHEN ITRAN(1,1) = -1  (OVER ALL DYADS)
      C----
0002          COMMON IPAGE,LINES,N1,N48,ICOL,IKCOL,KKCOL,NCAT,NCAT8,KPAT(2),
             1 JPAT(2),JTRAN(7,7),ITRAN(7,7),LTRAN(7,7),PNAME(2,40),CNAME(2,20),
             2 DNAME(60),KFREQ(15),KDUM(15),IMAT(2,500),IFREQ(2,500),IDUM(2,500)
             3 ,JFREQ(2,240),INIAC(2016),LNIAC(2016),LAST(12)
0003          DIMENSION DYAD(2),ADUM(7,7),SEXT(7,7)
      C----    K= NUM. OF ROWS, AND COLS, L = NUM. LEAVING OUT THE TOTALS
0004          K = 5
0005          L = K - 1
      C----    CHECK IF TO PRINT ONLY TRANS MAT. COLLAPSED OVER DYADS, IF SO
      C----      GO TO 220 TO CALCULATE AND PRINT
0006          IF(ITRAN(1,1) .EQ.-50) GO TO 220
      C----    FORCE DIAGONALS OF JTRAN(FREQ. OF REMAINING) = ITRAN(TRANS MAT)
0007          DO 4021 I = 1,K
0008     4021 JTRAN(I,I) = ITRAN(I,I)
      C----    ROW TOTALS
0009     6004 DO 4010 I = 1,L
0010          DO 4010 J = 1,L
0011          ITRAN(K,J) = ITRAN(K,J) + ITRAN(I,J)
0012          JTRAN(K,J) = JTRAN(K,J) + JTRAN(I,J)
0013     4010 LTRAN(K,J) = LTRAN(K,J) + LTRAN(I,J)
      C----    COLUMN TOTALS
0014          DO 4020 I = 1,K
0015          DO 4020 J = 1,L
0016          ITRAN(I,K) = ITRAN(I,K) + ITRAN(I,J)
0017          JTRAN(I,K) = JTRAN(I,K) + JTRAN(I,J)
0018     4020 LTRAN(I,K) = LTRAN(I,K) + LTRAN(I,J)
      C----    DO 5 ANALYSES, INDICATED BY FORMATS 4037, 4039, 4041, 4043, 4049
0019          DO 4050 M = 1,5
0020          IPAGE = IPAGE + 1
      C----    PRINT INITIAL HEADING
0021          WRITE(LINES,4025) IPAGE,DYAD,NSTEP,NSTEP
0022     4025 FORMAT('1  PAGE',I4,'  DYAD NO. ',2A4//3X,'TRANSITION MATRIX OF V
            1OCAL STATES,',',I3,'-SECOND STEPS (ROWS = N, COLS = N+',I2,')'/)
      C----    PRINT ANALYSIS HEADING
      C----              AND PRINT MATRIX THROUGH WR4, OR  COMPUTE AND THEN USE
      C----                    WR4
0023          GO TO (4036,4038,4040,4042,4044,4047), M
0024     4036 WRITE(LINES,4037)
0025     4037 FORMAT('  FREQUENCIES')
0026          CALL WR4(LINES,M,ITRAN,ADUM)
0027          GO TO 4050
0028     4038 WRITE(LINES,4039)  NSTEP
0029     4039 FORMAT('  FREQUENCY OF ENTERING AN N=N+',I2,' CELL')
0030          CALL WR4(LINES,M,LTRAN,ADUM)
0031          GO TO 4050
0032     4040 WRITE(LINES,4041) NSTEP
0033     4041 FORMAT('  FREQUENCY IN REMAINING IN AN N+',I2,' CELL AFTER ENTERI
            1G FROM N')
0034          CALL WR4(LINES,M,JTRAN,ADUM)
```

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FORTRAN V06.13                    14:25:12    28-JUN-74    PAGE    2

0045            GO TO 4050
0046       4042 WRITE(LINES,4043)
0047       4043 FORMAT('  TRANSITION PROBABILITIES')
          C---- DIVIDE EACH ROW BY ROW TOTAL, DIVIDE ROW TOTAL BY MATRIX TOT.
0048            DO 3036 I = 1,K
0049            DO 3036 J = 1,
0050            ADUM(I,J) = ITRAN(I,J)
0051       3036 ADUM(I,J) = ADUM(I,J) / ITRAN(I,K) * 100.
0052            DO 3037 J = 1,K
0053            ADUM(J,K) = ITRAN(J,K)
0054       3037 ADUM(J,K) = ADUM(J,K) / ITRAN(K,K) * 100.
          C---- ADD TRANSITION PROB. INTO SEXT (MAT FOR SUMMING OVER DYADS)
0055            DO 3038 I = 1,K
0056            DO 3038 J = 1,K
0057       3038 SEXT(I,J) = SEXT(I,J) + ADUM(I,J)
0058            CALL WR4(LINES,6,ITRAN,ADUM)
0059            GO TO 4050
0060       4044 WRITE(LINES,4045) NSTEP
0061       4045 FORMAT('  AVERAGE FREQUENCY OF REMAINING IN N+',I2,' AFTER ENTERIN
              1G FROM N')
          C---- DIVIDE FREQ OF REMAINING (JTRAN) BY FREQ. OF ENTERING (LTRAN)
0062            DO 4046 I = 1,K
0063            DO 4046 J = 1,K
0064            ADUM(I,J) = JTRAN(I,J)
0065       4046 ADUM(I,J) = ADUM(I,J) / LTRAN(I,J)
0066            CALL WR4(LINES,6,ITRAN,ADUM)
0067       4050 CONTINUE
0068            RETURN
0069        220 CONTINUE
0070            IPAGE = IPAGE + 1
          C---- PRINT HEADING FOR COLLAPSED MATRIX
0071            WRITE(LINES,321) IPAGE,NSTEP,NSTEP
0072        321 FORMAT('1  PAGE',I4,'  TRANSITION MATRIX COLLAPSED OVER ALL SUBJEC
              1TS.'/ '  VOCAL STATES,',I3,'-SECOND STEPS (ROWS = N, COLS = N+',I2
              3,')'/)
          C---- DIVIDE TOTAL SUM (OVER ALL DYADS) BY NUMBER OF DYADS
0073            DO 320 I = 1,K
0074            DO 320 J = 1,K
0075        320 SEXT(I,J) = SEXT(I,J)/NS
0076            CALL WR4(LINES,7,ITRAN,SEXT)
0077            RETURN
0078            END

          ROUTINES CALLED:
          WR4

          OPTIONS =/ON,/EK,/OP:2

          BLOCK        LENGTH
          WR5          1025    (004002)*
          $$$$$$       8074    (037424)

          **COMPILER ----- CORE**
             PHASE          USED  FREE
          DECLARATIVES    00622 13678
          EXECUTABLES     01131 13169
          ASSEMBLY        01552 17588
```

APPENDIX C

First Phone Contact:

Your Name
Peabody College
Dr. Vietze
Infant Laboratory
Kennedy Center

Dr. Vietze has been involved with infant research in Nashville for the past three years. We understand you have a son (or daughter).

Dr. Vietze is presently involved in a study of how babies learn about their environment in their first year of life. I'd like to tell you briefly now what the study involves and, if you are still interested, I'd like to send you a letter explaining about it in more detail. We are seeing each baby at 3 ages: when (he, she) is 2 1/2, 6 1/2 and 12 1/2 months old. At each age, we see the baby three times: once in the home and twice in our infant laboratory. We would like you to know about this study in more detail and would like to send you a letter explaining more about it, if you think you might be interested in participating. We would like to call back next week after you have a chance to read the letter, get your reaction to it, and answer any questions you may have. Then, if you are still interested, set up an appointment.

FIND OUT:

Do you plan to be in Nashville during the next year?
Are you planning to work during this time?
Check Address!

GEORGE PEABODY COLLEGE FOR TEACHERS
NASHVILLE, TENNESSEE 37203

C 2

THE JOHN F. KENNEDY CENTER FOR RESEARCH
ON EDUCATION AND HUMAN DEVELOPMENT

DEMONSTRATION AND RESEARCH
CENTER FOR EARLY EDUCATION

BOX 151
TELEPHONE 615 - 327-8236

Dear Parent,

Thank you for expressing interest in our research with infants here at Peabody College. We would like to explain a little more about this research project. During the past three years several hundred families with young infants have participated in infant research programs sponsored by the Demonstration and Research Center for Early Education (DARCEE), a component of the John F. Kennedy Center. This research is supported by Peabody College and by both Federal and State grants.

Because the first year of life is an extremely important one, a year marked by rapid growth and many developmental changes, we have focused our attention on the young infant. Until relatively recently we knew very little about what young babies could do. In fact, many persons still believe that newborn babies cannot see and do not learn. However, our research and that of others around the country is showing that even very young infants are sensitive and responsive to changes in their world and are capable of learning. Here at the Kennedy Center we have been looking at early learning, attentional, and socio-emotional processes in young babies.

The purpose of this research program is to examine the relationship between a cluster of important measures: infant learning and attention in the laboratory; infant behavior in the home setting; infant sensory-motor development; and parents' ideas and beliefs about young children. We are especially interested in how these relationships change during the first year of life. We are interested in working with normal, healthy infants and their mothers. In this study, we are interested in first born infants whose mothers are and will be the primary weekday caretaker for the length of the study. Because this is a longitudinal study, we need people who expect to be in Nashville for the next eleven months.

If you agree to be a family in our study, we would like to see your baby when he or she is 2 1/2 months old, 6 1/2 months old, and 12 1/2 months old. At each age we would like to come to your home to observe your baby in the normal home environment. We are interested in observing a bath, a feeding, and some playtime. We would like to watch your baby for 90 minutes at a time when only the Mother and baby would be there. Also, at each age we would like you to bring your baby to the Peabody Infant Laboratory twice--about a week apart. During these visits we will do three things. First, we will show your baby some pictures and watch to see how much he looks at them. Second, we will give your baby the opportunity to make a response (turning his head, pulling a string)

NATIONAL ADVISORY COMMITTEE
John J. Conger (Chairman), Raymond D. Adams, David L. Bazelon, Urie Bronfenbrenner, Jerome S. Bruner, Stuart W. Cook, Lloyd C. Elam, Mrs. Kathryn Gotham, Frank J. Hayden, Nicholas Hobbs, Julius B. Richmond, Mrs. Jeannette Rockefeller, Mrs. Lisbeth Bamberger Schorr, Mrs. Eunice Kennedy Shriver, R. Sargent Shriver, Jr., Robert M. W. Travers

which will cause something interesting to happen (a mobile will turn, a picture will appear on a screen). We will record the amount of time the baby looks at the object, his vocalizations and smiles, and the number of times he responds. Third, we will measure your baby's sensori-motor development with a scale that has been developed for this purpose. Also we will ask you to complete a short questionnaire for parents during your visit to the Infant Lab. Each visit should take from one to two hours.

Because this study is funded by a grant from the National Institute of Education, the Department of Health, Education, and Welfare requires that we obtain written consent from the parents of babies who participate in our study. If you agree to participate, we will be bringing a consent form to your home on our first visit.

We will be contacting you within the next week or two to answer any questions you may have and to find out if you would be willing to help us in this important and exciting research project. If you have any immediate questions, please feel free to contact us here at Peabody. The number is 327-8237 and Donna Burns, Mary Lou Ashe, or I will be happy to answer your questions.

Sincerely,

Peter M. Vietze, Ph.D.
Research Associate Professor of Psychology
Executive Officer, DARCEE

PV/pwg

Second Phone Contact:

Your Name
Peabody College
Infant Laboratory

Have you received our letter yet... and, have you had a chance to read it and think about it?

Do you think you would be interested in helping us out with our study?

Any questions?

We need to schedule you for the first visit - that will be the visit in your home where an observer will come to your home to see the baby for an hour and a half. We want to include a feeding, a bath, and some playtime, but won't interrupt your normal routine.

What day would be best for your? What time?

We'll call you on that day to confirm the time...

We'd also like to set up the first lab visit at this time. Best day? Time?